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FOCAL INFECTION

ITS BROADER APPLICATION IN THE ETIOLOGY OF GENERAL DISEASE *

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Circumscribed and confined infection, commonly expressed as focal infection, has long been recognized as an important etiologic factor in systemic disease. Yet as a principle it has not received sufficient attention from practitioners. In my opinion focal infection is very frequently related to local and general disease. Apparently it is an important factor in some systemic diseases, heretofore unsuspected.

For several years, the medical clinic of Rush Medical College and the Presbyterian Hospital has furnished a large number of patients suffering from chronic infectious endocarditis of the malignant type (*Streptococcus viridans*), arthritis deformans, rheumatic fever, nephritis acute and chronic, myocarditis chronica, exophthalmic goiter, cholecystitis, ulcer (peptic) of stomach, diabetes mellitus, etc. In addition to the usual clinical and laboratory investigations by the members of the clinic, collective and cooperative research has been carried on in connection with the workers of the Otho S. A. Sprague Memorial Institute and the Memorial Institute for Infectious Diseases. The "team work" has been truly cooperative and the results thereof have been published from time to time (Billings,[1] Davis,[2] Jackson,[3] Rosenow[4]).

The patients too, have cooperated by voluntary submission to slight operative measures to secure material, like localized exudates, bits of muscle, lymph-nodes, fibrous nodes, synovial membrane, erythematous nodes, etc., for histologic and bacteriologic study. Cultural and other blood-studies have been made. Functional tests have been carried on. In this way a more definite knowledge has been obtained of important principles relating to (*a*) the location and the nature of the infectious organisms of the focus; (*b*) the method of systematic infection, and the resulting morbid anatomy, and (*c*) the wider application of the etiologic importance of focal infection.

THE FOCUS OF INFECTION

The focus of infection may be located anywhere in the body. The usual site is in the head, in the form of alveolar abscess, deep tonsillar or peritonsillar abscess and chronic sinusitis. Cholecystitis, acute or chronic appendicitis, submucous abscess anywhere, salpingitis, vesiculitis seminalis, prostatitis, etc., are examples of the local conditions. Furthermore, secondary foci in lymph-nodes proximal to the primary focus and to systemically infected joints, muscles, etc., become additional sources of continued and more general infection. "Overdentistried" teeth may cause or prolong alveolar disease. Tonsillotomy may add a sealing scar to the infected tonsillar stumps.

An investigation may reveal more than one apparent focus of infection, an important fact, inasmuch as the source of infection must be removed as the first step in treatment. Patients much reduced from long illness may suffer from alveolar or other local infection, as a secondary process. These conditions must not be mistaken for the cause of the primary systemic disease. Such secondary local infectious foci may serve as adjuvants to further prolong and intensify systemic disease.

A study of the tissues and exudates of the focus usually yields various bacteria. Of the pathogenic bacteria, streptococci, pneumococci and staphylococci are most commonly found. Gonococci may be found in infected fallopian tubes, seminal vesicles, etc. Occasionally the tubercle bacillus is found in tonsillar and peritonsillar tissues. Colon mixed infection may occur anywhere. The *Bacillus aerogenes capsulatus* is not infrequently found in pathologic tissues and exudates. A study of the streptococcus group so obtained shows, in many instances, a pathologic specificity for certain tissues when injected into rabbits or other animals. Strains obtained from cultures made from tissues and exudates of patients suffering from chronic arthritis produce arthritis in the inoculated animal; strains obtained from the focus of patients with hemorrhagic nephritis, cause nephritis in the inoculated animal; strains obtained from the focus in the patient with rheumatic fever, endocarditis and pericarditis result in pancarditis and acute arthritis in the inoculated animal, etc. (Billings,[1] Davis,[2] Jackson,[3] Rosenow[4]). Furthermore, the brilliant work of Rosenow proving the transmutability of the micro-organisms of

* Read before the Section on Practice of Medicine at the Sixty-Fifth Annual Session of the American Medical Association, Atlantic City, N. J., June, 1914.

1. Billings, Frank: Chronic Infectious Endocarditis, Arch. Int. Med., November, 1909, p. 409; Chronic Focal Infection as a Causative Factor in Chronic Arthritis, THE JOURNAL A. M. A., Sept. 13, 1913, p. 819; Chronic Focal Infections and Their Etiologic Relations to Arthritis and Nephritis, Arch. Int. Med., April, 1912, p. 484; Clinical Aspect and Medical Management of Arthritis Deformans, Illinois Med. Jour., 1914, xxv, 11; Focal Infection in Relation to Systemic Disease in Forchheimer Therapeusis of Internal Diseases, New York, D. Appleton Company, 1914, v, Chap. iv.

2. Davis, D. J.: Bacteriological and Experimental Observations on Focal Infection, Arch. Int. Med., April, 1912, p. 505; Chronic Streptococcus Arthritis, THE JOURNAL A. M. A., Sept. 6, 1913, p. 819.

3. Jackson, Lelia: Experimental Rheumatic Myocarditis, Jour. Infect. Dis., 1912, xi, 240; Experimental Arthritis in Rabbits, ibid., 1913, xii, 364.

4. Rosenow, E. C.: The Study of Pneumococci from Cases of Infectious Endocarditis, Jour. Infect. Dis., 1910, vii, 410; The Etiology of Articular and Muscular Rheumatism, THE JOURNAL A. M. A., April 19, 1913, p. 1223; The Production of Ulcers of the Stomach by Infections of Streptococci, ibid., Nov. 29, 1913, p. 1942; Transmutation Within the Streptococcus = Pneumococcus Group, Jour. Infect. Dis., 1914, xiv, 1; Preliminary Note on the Etiology of Arthritis Deformans, Tr. Chicago Path. Soc., 1914, ix, 115; THE JOURNAL A. M. A. April 11, 1914, p. 1146.

the streptococcus-pneumococcus group has helped to a better understanding of the changing pathogenic specificity of these bacteria. Apparently transmutation of a strain of this group may occur in the focus of infection. The oxygen supply of the tissues about the focus seems to be an important factor in the transmutation of the micro-organism. In consequence it may take on characteristics which render it pathologically specific in the infection systematically of joint-tissues or of muscles including the myocardium, or of tendons and aponeuroses or of endocardium and pericardium or of gall-bladder or of mucosa of stomach and intestine or of pancreas, or of kidney, respectively. Apparently strains with an affinity for joint-tissues and muscles, or for joint-tissues, endocardium and pericardium may develop in the primary focus. Inoculations with strains obtained from patients suffering from chronic arthritis, rheumatic fever, with endocarditis and pericarditis, myositis, peptic ulcer (surgically excised), cholecystitis (surgically operated), chronic infectious endocarditis (blood-culture), have resulted in the production of the respective lesions in the experimental animal. The interesting experiments proving the transmutation of the streptococcus-pneumococcus group by Rosenow,[4] and the positive results obtained by him in making cultures by new and ingenious methods, from tissues and exudates, in the various diseases named, have made clear many clinically obscure conditions. The transmutation of the strains in growth and specific pathologic characteristics explains, too, the varying and often contradictory results of various research workers in inoculation experimentation with animals.

METHOD OF SYSTEMIC INFECTION AND RESULTING MORBID ANATOMY

Probably the infective agent passes from the focus to other tissues through the blood-stream. Histologic examination of joint structures, heart-valves, muscles and other tissues of inoculated animals shows embolic bacterial masses in the terminal arteries. Endothelial proliferation at the site of the embolus closes the vessel lumen. Muscle and joint-capsule show embolism, local hemorrhage and endothelial proliferation closing the lumen of the vessels. The same process takes place locally in the submucosa of the stomach and intestine and of the fundus of the gall-bladder. Anemic necrosis and rupture into the gall-bladder is a cause of cholecystitis, acute or chronic, and if the latter, gallstones may form. The specific streptococcus may invade vessels of the pancreas. Acute severe pancreatitis may result, or a lesser degree of infection may so diminish the blood-supply of the organ as to disturb its function, and temporary or severe glycosuria supervenes. Lessened nutrition and oxygen of the infected tissues due to the mode of infection bring about characteristic results. The anatomic changes in capsule, cartilage and bone of joints, in muscles, tendons and aponeuroses which are characteristic of chronic arthritis may be produced by ligation of some of the nutrient arteries of joints, muscles, etc. (Oxhausen[5]). Furthermore, the strains of streptococci which apparently cause chronic deforming arthritis and myositis grow best in a low oxygen tension and even grow anaerobically. The method by which they invade the tissues produces a condition of the tissues in which they thrive. The peculiar characteristics of the mode of infection, the diminished blood-supply to the tissues, the resulting morbid anatomic change and the suitable mediums for continued viability and growth of the infectious agent, explain, in part at least, the progressive nature and the difficulty of successful management of arthritis deformans.

A characteristic directly opposite of this is evident in chronic infectious endocarditis due to the *Streptococcus viridans*. Here the infection is undoubtedly hematogenous. The scar of healed endocarditis and valvulitis is often predisposing. This infectious agent grows best in a high oxygen content. The circulating blood furnishes this in abundance. It causes an abundant vegetative growth on the valves and endocardium. In this nidus, swimming in oxygen it multiplies, becomes immunized against the host and resists every method of treatment.

Acute rheumatic fever is of undoubted focal origin. The newer methods of bacterial culture (Rosenow[4]) have proved the presence, usually, of the infectious organism in the joint-fluid, and it may always be found in the synovial membrane and proximal lymph-nodes during the height of the disease. The strain of the streptococcus which produces these acute lesions also has an affinity for the endocardium and pericardium and often for the myocardium and some groups of the skeletal muscles. Apparently the micro-organism has other affinities. One of the clinical group (Woodyatt) called attention to an apparent thyroiditis in some of the patients suffering with acute rheumatic fever. The thyroid gland was palpably enlarged and tender on palpation. There was moderate tachycardia, tremor of fingers, unusual nervousness, excessive sweats and diminished carbohydrate tolerance. Of five patients then in wards, suffering with acute rheumatism, three showed this evidence.

CASE 1.—A. X., man, aged 35, married, porter, Greek, admitted, April 1, 1914. Diagnosis: Rheumatism, acute; tonsillitis acute; thyroiditis. Complaint: March 30, 1914, illness began with soreness of throat, chilliness, pain in lumbar muscles and left heel and swelling and much pain in knees. Profuse sweats at night. Anorexia, thirst and constipation. Had rheumatic fever in 1900 and several minor attacks since then. Examination: Well-nourished; teeth good; tongue, slight whitish fur; tonsils very large, red and infected; thyroid, palpably enlarged and tender; heart and lungs normal; spleen palpable; knee-joints hypersensitive but not swollen; profuse sweating; fine tremor of fingers; temperature from 102 to 104 F.; pulse 90 to 100; blood-pressure 125 systolic; blood, reds 4,440,000, whites 13,500, hemoglobin 70 per cent.; urine scant, 1.028, acid, albumin trace, casts 0. April 2, 7 a. m., glucose, 50 gm., given before breakfast. Urine voided and examined each hour. Glucose present only in specimen voided at 9 a. m. Treatment: Compound pills of rhubarb, as necessary; sodium salicylate and bicarbonate 1 gm. every three hours; oil of wintergreen and bandages applied to joints. April 18, discharged, recovered. Tonsillectomy advised and refused. April 19, readmitted for slight recrudescence. No joint-swelling and no fever. April 22, discharged; tonsillectomy refused. May 30, readmitted for tonsillectomy. Cultures from depths of tissue of excised tonsils yielded almost pure cultures of a green-producing streptococcus.

CASE 2.—P. K., man, aged 25, single, laborer, Greek, admitted, April 12, 1914. Diagnosis: Rheumatism acute; endocarditis; thyroiditis; tonsillitis acute. Complaint: Acute inflammation of many joints; began nine weeks ago with sore throat, fever, sweats, etc. In Francis Willard Hospital two weeks. Apparent recovery. Recrudescence three weeks ago with sore throat, pleurodynia and polyarthritis. Denies venereal disease. Examination: Well-nourished; sweating and

5. Oxhausen, G.: Ueber Einfache aseptische Knochen und Kurrpelenkrose, Chronditis desiccans und Arthritis deformans, Verhandl. d. deutsch. Gesellsch. f. Chir., Berlin, 1912, xlii, Part 1, p. 40, Part 2, p. 446.

hypersensitive skin; tonsils large, red and infected; teeth negative; thyroid gland palpable, enlarged and lobes tender to touch; heart, left border, dulness 13 cm.; systolic murmur at mitral area; second pulmonic tone accentuated; rate 100 to 110; many points swollen, hypersensitive and painful to movement; fine tremor of hands; fever, remittent 99 to 101 F. Reds 5,260,000, whites 10,300, hemoglobin 70 per cent; blood-pressure 135 to 145 systolic; urine scant, 1.022, acid, albumin 0, sugar 0, casts 0. April 14, 50 gm. glucose given before breakfast at 7 a. m. At 8 a. m. urine = sugar 0. At 9 a. m. urine = sugar present. At 10 a. m. urine = sugar 0. Treatment: Cleansing mouth- and throat-washes; sodium salicylate and bicarbonate each 1.3 gm. every three hours; oil of wintergreen and compresses of cotton applied to joints. April 17, joints still swollen and painful. Fine tremor of fingers, systolic murmur at mitral area. April 29, convalescent. Tonsils reduced in size and no visible infection. Thyroid gland comparatively smaller and not sensitive to palpation. Systolic murmur at mitral area. May 5, discharged recovered. Tonsillectomy advised.

CASE 3.—P. X., man aged 27, single, laborer, Greek, admitted, May 10, 1914. Diagnosis: Rheumatism acute; tonsillitis acute; thyroiditis. Complaint: Six days ago acute sore throat, which was followed in two days by painful swollen fingers and wrists and later all joints of extremities involved except hips and shoulders. Much sweating, headache and nervousness. Anorexia and constipation. Fever for six days. Similar attack six years ago. Denies venereal disease. Examination: well-nourished and developed. Face flushed. Skin sweating and hypersensitive. Tongue tremulous and coated, grayish-white. Teeth, sound. Tonsils large, red and infected. Thyroid, palpably enlarged and tender. Heart and lungs normal. Polyarthritis acute of all joints of extremities excepting shoulders and hips. Temperature 100 to 102.4 F. Pulse 100 to 120. Urine, 1.028, acid, trace of albumin and a few hyaline casts. Blood: Reds 5,020,000, whites 17,800, hemoglobin 70 per cent. Blood-pressure 110 systolic. May 12, 7 a. m., given glucose, 50 gm. In three hours voided in urine glucose, 1.34 gm. Treatment: sodium salicylate and bicarbonate, each 1.3 gm. every two to four hours; oil of wintergreen and compresses of cotton applied to joints. May 28, discharged recovered. Tonsillectomy advised.

A review of the foreign literature of the last seven years shows the recognition of enlargement of the thyroid gland in acute articular rheumatism as a frequent occurrence. Vincent[6] was apparently the first to note the fact. During 1906 and 1907 he made several reports to the Société médicale des hopitaux de Paris. Nov. 21, 1907, he reported that of 186 patients suffering from acute articular rheumatism he observed swelling and tenderness of the thyroid gland in 86 patients. In another communication he states that thyroiditis occurred in 66 to 68 per cent. of his patients who suffered with acute articular rheumatism. Eleven patients with acute rheumatism presented thyroid enlargement with tenderness, with acute symptoms of intoxication; tremor of fingers, tachycardia, extra cardiac murmurs and throbbing of vessels, profuse sweats, etc. Vincent observed a subsidence of the thyroid swelling, tenderness and overfunction coincidently with convalescent stage of the rheumatism. Vincent apparently interprets the thyroid enlargement and overfunction to a reciprocal reaction of the body in defence of the rheumatic infection. He observes that in obstinate acute rheumatism with complications the thyroid may be only moderately enlarged and may quickly subside. He believes this explains the value of iodids in obstinate cases. He also thinks that the salicylates are of value in reducing this type of thyroiditis. He reports the continuation of the thyroid enlargement with all the phenomena of exopthalmic goiter in several patients and in a few patients with rheumatic thyroiditis subsequent atrophy of the gland with the development of scleroderma and other symptoms of hypothyroidism. Sougnes[7], Albertin[8] and Weintrand[9] report similar observations of thyroid enlargement, tenderness and symptoms of hyperthyroidism in acute rheumatic fever.

None of these reporters mentions the probability of the thyroid enlargement and tenderness being due to the same rheumatic infectious agent of focal origin.

These reports and the meager personal experience noted in the cases cited aroused the interest of the clinic as to the possibility of focal infection as a cause of goiter. The following case-reports are interesting and seem to show that there is an infectious type of goiter with and without symptoms of exophthalmic goiter, which seems to be of focal origin. The rapid subsidence of the goiter and the symptoms after removal of the foci of infection in the jaws and tonsils was a surprise. Bacteriologic examination of the tissues and alveolar pus revealed mainly streptococci. Autogenous vaccines were used with one exception in all the patients. No drug treatment with the exception of iron, for one, was used.

CASE 4.—Mrs. C. F., married, aged 49, U. S., admitted April 30, 1914. Diagnosis: Exophthalmic goiter; tonsillitis chronica; abscesses alveolaris. Complaint: Frequent sore throat; goiter for two years; muscular tremor for one year, much worse recently; tachycardia for more than a year; dyspnea of exertion; nervous and emotional; gradual loss of weight; lessened strength and endurance. Menopause at 47. Examination: Skin pale, pseudoscleroderma of hands, forearms and forehead; eyes normal; no lymphadenopathy; large goiter, partially cystic; heart, left border dulness 11 cm., tones pure, rate 96 to 100; muscular tremor, fingers; many carious teeth with alveolar infection (roentgenograms); tonsils enlarged, fissured and infected; blood: reds 4,700,000, whites 7,800, hemoglobin 65 per cent.; urine, normal; blood-pressure, 130, systolic. Treatment: Tonsillectomy; extraction of all teeth; rest and plentiful food. Result: May 12, 1914, discharged much improved. Goiter diminished more than half; symptoms of hyperthyreoidea practically nil.

CASE 5.—Miss J. L., aged 18, telephone operator, U. S., admitted May 2, 1914. Diagnosis: Exophthalmic goiter; tonsillitis chronica; abscesses alveolaris. Complaint: Goiter, nervousness and emotion; muscular tremor; tachycardia; dyspnea of exertion; loss of weight and strength; headache; hot flashes and profuse perspiration; tonsillitis and confinement to house for a week every winter. Duration of symptoms six years. Examination: Well-nourished and good color. No exophthalmos; tonsils large and infected; six molar teeth show alveolar infection (roentgenograms); a moderate symmetrical, firm goiter; heart normal, pulse 80 to 110; temperature subfebrile; tremor of fingers; blood, normal; urine, normal; blood-pressure 100 systolic. Treatment: tonsillectomy, extraction of teeth with infected roots, autogenous vaccination with strains of streptococci obtained from tonsils and dental canals. May 18, 1914, discharged to family physician. Goiter has disappeared. Symptoms of hyperthyreoidea much improved. June 18, 1914, the family physician reports the patient in good condition of health.

CASE 6.—Miss M. W., aged 20, telephone operator, U. S., admitted May 12, 1914. Diagnosis: Exophthalmic goiter; tonsillitis chronica. Complaint: Goiter for unknown period;

6. Vincent, H.: Sur la reaction thyroïdienne dans la rhumatisme aigu, et sur l'origine rhumatismale de certain cas du goitre exophthalmique, Compt. rend. Soc. de biol., 1907, lxiii, 389; Rapports de la maladie Basedow avec le rhumatisma aigu, Bull. de la Soc. méd. de Paris, 1907, xxiv, 1286; Semaine méd. March 20, 1907, p. 143; ibid., Nov. 21, 1907, p. 575; ibid., Jan. 1, 1908, p. 47; ibid, Oct. 28, 1908, p. 527.

7. Souges, A.: Goitre exophthalmique et rhumatisme articulaire aigu, Semaine méd., Jan. 26, 1910, p. 47.

8. Albertin, André: Le corps thyroide et le rhumatisme articulaire aigu, Thèse de Paris, 1911; Arch. de méd. 1911, iv, 260.

9. Weintrand, W.: Der akute Gelenk rheumatismus, Spezielle Path u. Ther. inner. Krankheit., Berlin, Kraus und Brugsch, 1913-1914, ii. Part 2, pp. 128 and 148.

rapid increase in size recently; tachycardia for year or longer; dyspnea of exertion; nervous and emotional; frequent subjective flashes of heat; prominence of eyeballs for a few weeks; loss of 15 pounds in weight in last few months; frequent sore throat; tonsillotomy three years ago. Examination: General pallor; moderate exophthalmos and lagophthalmus; tonsil stumps large and infected; teeth good, some dentistry; thyroid enlarged, symmetrical and firm; heart normal size, rapid, 100 to 120, somewhat irregular, tones pure, but snappy; tremor of extended fingers; reds, 3,300,000, whites 8,300, hemoglobin 60 per cent.; blood-pressure 125 systolic; urine, normal. Treatment: Tonsillectomy; rest; hematinics and plentiful food. May 20, 1914, discharged to family physician, much improved. June 18, 1914, family physician reports the patient much improved. Goiter much diminished in size. General condition excellent.

Case 7.—Miss M. K., aged 24, telephone operator, U. S., admitted April 18, 1914. Complaint: Chronic arthritis of joints of fingers; frequent tonsillitis; goiter; occipitofrontal headache, fainting attacks and nervousness. Examination: Well-nourished; good color; tonsils large, fissured and infected; four lower teeth show alveolar infection (roentgenograms); swelling, soreness and stiffness of many joints of fingers; heart, lungs, urine and blood normal. No symptoms of hyperthyreoidea. Treatment: Tonsillectomy, extraction of teeth with infected roots, autogenous vaccination with streptococci (*S. viridans* and *S. hemolyticus*) obtained from tonsils and dental canals. May 10, 1914, discharged much improved. June 6, 1914, returned and reported ability to return to work. Goiter practically disappeared. June 18, 1914, patient at work. Goiter about one half original size. General condition good. Arthritis of fingers much improved.

Case 8.—Miss M. M., aged 21, telephone operator, U. S., admitted May 18, 1914. Diagnosis: Goiter; tonsillitis chronica. Complaint: Frequent sore throat, hoarseness; goiter of unknown duration, intermittent enlargement of lymph-nodes of anterior triangles of neck; nervous and emotional; lessened strength and endurance. Examination: Moderate exophthalmos and lagophthalmus; tonsils enlarged, fissured and infected; teeth, no visible infection, much dentistry; thyroid enlarged, chiefly the isthmus and right lobe; a few palpable submaxillary lymph-nodes; heart normal, 68 to 80; slight tremor of extended fingers; reds, 4,800,000, whites 10,300, hemoglobin 75 per cent.; blood-pressure 120 systolic; urine normal. Treatment: Tonsillectomy and rest. May 25, 1914, discharged to family physician much improved. June 18, 1914, family physician reports condition improved with the thyroid almost normal size.

Case 9.—Miss E. S., aged 23, U. S., admitted May 19, 1914. Diagnosis: Exophthalmic goiter; tonsillitis chronica; impacted molar teeth. Complaint: At 17 became nervous and emotional, had tachycardia, loss of weight and strength, muscular tremor, moderate goiter, sweating, diarrhea, etc. Diagnosis of exophthalmic goiter and operation advised by home physician. Instead took rest cure. Improvement. Since then invalid with periods of improvement alternating with relapses. Now has tachycardia with irregular beating; nervousness, with hot flashes, insomnia and varying emotions; muscular tremor, generalized; profuse perspiration; diarrhea; occasional nausea and vomiting; weakness; loss of weight; exophthalmos and goiter. Had acute rheumatism at 12; sore throat on rare occasions. Menses irregular. Examination: Fairly nourished. Moderate exophthalmos; teeth, no caries, impacted molars (roentgenogram); tonsils large, buried, smooth exposed surfaces; thyroid visibly and palpably enlarged; heart, left border dulness 11 cm., rate 100 to 120, rhythm, somewhat irregular, tones pure; tremor marked; temperature range 98.6 F.; carbohydrate tolerance to glucose gm. 50.0 normal; urine normal; blood-pressure 140 systolic; reds 4,500,000, whites 9,000, hemoglobin 80 per cent. Treatment: Tonsillectomy. Removal of impacted teeth. Rest. June 3, 1914, discharged to family physician. Goiter and symptoms of hyperthyroidea practically disappeared. June 16, 1914, a letter from the patient's sister states marked condition of general improvement. She says patient expresses surprise at the disappearance of uncomfortable sensations which had existed so long that she had thought them natural phenomena.

Case 10.—Miss G. O'B., aged 23, telephone operator, U. S., admitted May 20, 1914. Diagnosis: Exophthalmic goiter; tonsillitis chronica; abscess alveolaris; anemia secondary. Illness began one year ago with severe tonsillitis. Soon noticed goiter with extreme nervousness, muscular tremor, tachycardia and a complete nervous collapse in March, 1914. Examination: Well-nourished; pale; nervous; marked muscular tremor; no exophthalmos; symmetrically enlarged thyroid gland; three carious teeth with alveolar infection (roentgenogram); infected faucial tonsils; subfebrile temperature; pulse 96 to 130, heart-tones normal; blood: reds 2,580,000, whites 13,600, hemoglobin 40 per cent.; blood-pressure 125 systolic; urine normal. Treatment: Tonsillectomy; extraction of teeth with alveolar infection; hematinics; rest and good food. Result: Rapid improvement in goiter and symptoms of hyperthyreoidea. June 18, 1914, patient continues to improve in a general way. Anemia less. Goiter still palpable, but symptoms of overaction of thyroid practically gone. This patient is the only one of the series of women who has not received vaccines.

No thyroid gland tissue was examined. Dr. E. C. Rosenow has recently made cultures from the deep tissues of many goiters, removed surgically in the treatment of exophthalmic goiter. Without exception he has been able to isolate and grow a streptobacillus of characteristic qualities. He is making experiments with the organism by animal inoculation and will make a report soon.

Farrant[10] has investigated the pathologic changes of the thyroid in disease. He finds that certain microorganisms and certain toxemias may cause either a chronic hyperplasia with colloid or a complete acute hyperplasia. In the acute type the *B. aerogenes capsulatus, B. diphtheriae, B. dysenteriae* (Asylum, Shiga and Flexner types), *B. anthracis, B. tuberculosis, B. mallei,* bacillus of tetanus, *Micrococcus catarrhalis, Spirochaeta pallida, Plasmodium malariae,* chronic nephritis, cirrhosis of liver and toxemias due to abrin, ricin and diphtheria toxin produced rapid hyperplasia. Animal inoculation and examination of animal and human thyroids were the basis of the report.

In the chronic type, the coliform bacillus (chr.) tuberculosis, chronic, Malta fever, syphilis, actinomycosis, acute poliocyelitis, rheumatic fever, scarlatina and pernicious anemia were associated with thyroid enlargement. Involution of the thyroid followed the subsidence of the systemic disease.

That Farrant should not find acute hyperplasia in rheumatic fever is probably due to the absence of clinical observation.

THE WIDER APPLICATION OF THE ETIOLOGIC IMPORTANCE OF FOCAL INFECTION

To the now well-known relation of focal infection as a chief factor in the etiology of acute rheumatism, chronic deforming arthritis, gonorrheal arthritis, malignant endocarditis, myositis, myocarditis, septicemia of various bacterial types, tuberculosis, nephritis and visceral degeneration, we may add certain infectious types of thyroiditis, with or without hyperthyroidism, pancreatitis acute and chronic, with or without resulting glycosuria, peptic gastric and duodenal ulcer and cholecystitis.

With the defenses of the body diminished by overwork, exposure to cold, dissipation, insufficient or improper food, unhygienic surroundings, injuries from

10. Farrant, Rupert: The Pathological Changes of the Thyroid in Disease, Brit. Med. Jour., Feb. 28, 1914, p. 470.

former disease, (valvular scar) or trauma, the individual may suffer from acute rheumatic fever, chronic arthritis, myositis, chronic infectious endocarditis, pneumonia, ulcer of stomach, cholecystitis or pancreatitis, respectively dependent on the phase of mutation in pathogenicity, and affinity of the strain of the streptococcus-pneumococcus group in the focus of infection. These principles are important because proper management may (*a*) prevent the systemic disease and (*b*) guide one in the proper treatment of the systemic disease. The recognition and removal of chronic foci anywhere in the body is imperative as a prevention of progressive ill health. Emphasis should be made of chronic alveolar abscess, often unrecognized by the patient. Film roentgenograms of the jaws is often the only means of recognition. A pathologic tonsil is a menace and should be wholly removed. Chronic cholecystitis and chronic appendicitis should be promptly treated surgically. Chronic sinusitis may exist for years and finally be an important factor in the development of systemic disease. Following the removal of the focal infection, adequate individual and general hygiene will improve the body defenses and health will be maintained.

The removal of the focus of infection is demanded as a fundamental principle, in the treatment of the systemic diseases especially of the chronic type. Thereafter the management must be individual, based on the character and location of the infection. The attempt to immunize the patient against the infection must be attempted by restorative measures—food, pure air, passive and active graduated exercise, hematinic and other tonics, optimistic surroundings, etc. Autogenous vaccines may be used with rational reservation.

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THE NEWER BACTERIOLOGY OF VARIOUS INFECTIONS AS DETERMINED BY SPECIAL METHODS *

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The bacteriology of most infections as worked out heretofore is largely the bacteriology of the fluids of the body and semifluid exudates. In acute infections a bacteriologic study of the fluids commonly yields trustworthy results, but in many chronic conditions the cultures are usually sterile and demonstration of bacteria in the tissues usually fails.

In this short paper I wish to describe methods for making cultures particularly from excised tissues and from the blood and other fluids in which due regard is paid to the question of oxygen pressure, particularly in the primary culture, and to detail very briefly the results obtained by their use in various infections.

PREPARATION OF THE EMULSION FROM THE TISSUES

The tissues are excised with strict aseptic precautions usually under local anesthesia and cultures made at once, a portion being reserved for microscopic study. In addition to the great care used to avoid contamination from skin or air the surface of the part used for cultures is sterilized by dipping it into boiling water, or even better, into a vigorous Bunsen flame, or seared with a hot blade, then rapidly cooled in sterile salt solution and emulsified in the specially devised sterile air-chamber or "tissue-crusher" shown in the accompanying illustrations. The amount of heat used is determined by the size of the tissue at hand. Whenever possible, pieces of tissue at least 2 to 3 cm. in diameter are used for cultures.

The chamber (Fig. 1) is somewhat similar to the one already described[1] except that it contains a larger mortar and a small-sized meat-chopper.[2] It consists of an air-tight tin can (19 by 23 cm.) containing a large (10 cm.) hole on one end with a flanged rim to which is tied a long-sleeved, heavy, fleece-lined canvas glove; there is a smaller side opening (3 cm.) which is plugged with cotton and a large opening (8 by 12 cm.) at the top which is covered with mica and held in place by circular wires and surgeons' adhesive plaster. The meat-chopper is held in place through a hole at the farther end through which the shaft extends and a hole at the bottom through which a thumb-screw fits whereby it is clamped to a wood extension, fastened to a semicircular wood board nailed to the end. On the inside is fastened a suitable-sized tin can which serves as the mortar holder. The container without the meat-chopper answers very well for small or relatively soft tissues, such as the lymph-glands in arthritis, while the one containing the meat-chopper is preferable for emulsifying larger and firmer tissues such as the thyroid gland, cystic ovaries and the glands in Hodgkin's disease. Sterilization is done in dry heat at 160 C. (320 F.) for one hour. For actual use the right hand and forearm are thoroughly scrubbed with soap and water and soaked in 1:1,000 mercuric chlorid and then introduced into the container and glove. Alcohol should not be used in sterilizing the hand because the vapors are apt to ignite with explosive violence when the side opening is flamed after removing the cotton plug; the mouth of the tube or bottle containing the tissue is flamed and held near the small opening in the side and the tissue grasped with long sterile forceps, and with the least possible exposure to the room air, inserted into the container and either cut into small pieces with the scissors or passed through the meat-chopper. Great care is exercised at all times not to move the gloved hand in or out of the container while the cotton plug is removed.

Fig. 1.—Sterile air chamber. The right hand is used inside the apparatus.

* Read before the Section on Practice of Medicine at the Sixty-Fifth Annual Session of the American Medical Association, Atlantic City, N. J., June, 1914.
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After grinding the tissue in the mortar for a time, sterile quartz-sand and the emulsifying fluid, usually dextrose broth, are poured into the mortar through the side opening from thoroughly flamed test-tubes. The cotton plug is reinserted and the emulsifying process is continued. The emulsion when completed is poured into a thoroughly flamed test-tube or graduate of suitable size, inserted through the side opening.

In attempting to simplify as much as possible the emulsification of tissues and to check up the results obtained with the sterile air-chamber, the "tissue-crusher" (Fig. 2), a modification of the method used by Hirschfelder to obtain tissue juice, was devised. It consists of two close-fitting threaded metal tubes; the outer tube is fitted with an air-tight removable bottom, the inner surface being made rough, and a four-sided rim, while the inner tube is fitted with a removable disk containing numerous very small drilled holes and a handle which serves as a wrench. The inner tube is plugged with cotton and placed inside

Fig. 2.—Tissue crusher.

the other and the instrument sterilized in hot air. In order to prevent leakage the thread of the inner tube should be covered with hot sterile paraffin or petroleum oil just before using. The tissue is placed in the outer tube and the inner tube turned in the outer, using the necessary force until the tissue is crushed and expressed into the inner tube. The instrument is now held slantwise, the cotton plug flamed and removed, the emulsifying fluid added and the emulsion transferred to a sterile test-tube with a sterile pipet.[3]

METHOD OF PREPARING THE BLOOD-CULTURES

In order to furnish bacteria from the blood and other sources a gradient of oxygen pressure, the following method for making blood-cultures has been used with good results: From 15 to 30 c.c. of blood are withdrawn from the vein at the bend of the elbow in the usual way and decalcified, by adding it to a solution of 2 per cent. sodium citrate in sodium chlorid solution in the proportion of 5 c.c. of blood per 1 c.c. of solution. Control tests have shown that the bacteria contained in the blood from a wide range of conditions live in this solution for at least seventy-two hours. The citrate solution is kept in a tube of suitable size closed by an aluminum screw-top containing a rubber disk and sealed with paraffin. This may be used at the bedside and then sent to the laboratory for cultures in case, for some reason, it is not convenient to make the complete culture at the bedside. In my work a portion of the citrated blood has been at once planted and the remainder added by means of a sterile pipet to sterile distilled water contained in bottles which serve as centrifuge tubes, there being at least 10 parts of water to 1 part of citrated blood. This is centrifuged at once and the supernatant hemoglobin containing water is poured off or the sediment removed with a sterile pipet, and planted. The sterile water serves as a means of getting rid of the hemoglobin and the serum. Control tests with the serum after the corpuscles have separated by gravity show that in the aerobic cultures the inhibiting action of the hemoglobin is more marked than that of the serum; in fact, the serum is a desirable constituent in streptococcal cultures. Hence in suspected streptococcal infections the serum and the sediment of the dissolved corpuscles may be planted separately. In some instances the hemoglobin has been converted into methemoglobin by passing carbon monoxid (illuminating gas) through the decalcified blood by means of a sterile pipet containing a long sterile cotton plug.

THE PREPARATION OF THE CULTURES

The emulsion of the tissues or the sediment of the dehemoglobinated blood is inoculated in the way best suited for the particular case at hand. Shake-cultures in tall columns (10 to 20 cm.) of ascites dextrose (1 per cent.) agar and plain agar (0.5 to 0.8 per cent. acid to phenolphthalein) with or without serum have yielded the best results. The ascites fluid is collected in a sterile manner and heated on successive days to 60 C. (140 F.) for one hour or for twenty-four hours and used only after the sterility has been determined. To 9 parts of 0.5 per cent. agar, prepared from Liebig's extract of beef and Witte peptone, 1 part of ascites fluid is added with a sterile pipet after the agar is either thoroughly boiled in a bath or steamed in an Arnold sterilizer for at least fifteen minutes to drive off molecular oxygen, and cooled to 60 C. The emulsion or other material is added to the agar when cooled to 39 C. (102.2 F.) by inserting the mouth of the pipet to the bottom and forcing out its contents while the pipet is withdrawn. After the cotton plug is flamed and replaced in the test-tube the further mixing is accompanied by partially inverting the tube once or twice. Care is exercised not to blow bubbles of air through the agar.

Owing to the oxygen-consuming power of living cells the bottom of the tubes is rendered anaerobic while the top necessarily remains aerobic, and the space between represents a gradient of oxygen pressure between the two extremes. In order to bring about a still greater range of conditions in view of the consideration that the emulsion or tissue juice may be bactericidal or may favor the growth of the bacteria,

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only a small amount of emulsion is added to some tubes and a large amount to others. In the case of the blood-sediment or joint fluid when only a small amount is at hand, pieces of sterile rabbit or guinea-pig tissue are added to the bottom of the tube if strict anaerobic conditions are desired. A gradient of H and OH ions in the mediums, obtained by superimposing a plus 1 agar or a minus 1 agar and vice versa has also been found useful in some conditions.

Plain serum or ascites, agar and broth, ascites-dextrose-broth in tall tubes, enriched ascites fluid, with or without sterile tissue the surface of Loeffler's serum, plain and dextrose blood-agar slants and plates, kept under aerobic and anaerobic conditions, and at times litmus-milk and ox-bile, and in Hodgkin's disease Dorset's egg mediums are also inoculated. These, while not as favorable culture mediums, have yielded positive results in isolated instances when the shake-cultures in agar were negative. The cultures are incubated at 37 C. for ten to fourteen days before they are discarded. The tubes of dextrose-agar are carefully examined for colonies in a strong light. Smears are made from the water of condensation of the Loeffler's serum and blood-agar slants, of the liquid cultures if turbid and of the sediment always, and from the bottom of the tube of agar even though no colonies are found. Colonies in the depths of the dextrose-agar are examined by breaking the tube crosswise by means of a glass cutter and a red-hot bead at the end of a glass pipet, the surface of the tube being sterilized in the flame just before breaking it. If a positive result is obtained, at least one of the subcultures is made in such a way as to reproduce as nearly as possible the conditions under which the original growth was obtained. This point is particularly important with those strains which show a preference for anaerobic conditions. Search for unknown bacteria was made in smears stained in various ways from the cut surface of the glands and various emulsions and from the depths of the cultures both by staining and with the aid of dark-field illumination.

RESULTS

By this method, which is similar to those employed by Theobald Smith and Noguchi but in which there is afforded not only aerobic and anaerobic conditions but a gradation of oxygen pressure between these two points, a gradation of H and OH ions, and a wide range of nutrition, positive cultures have been obtained frequently while cultures made in the usual way remained sterile.

Thus certain non-hemolyzing streptococci have been isolated from the blood repeatedly when the usual method failed or showed much fewer colonies; in leukemia this has happened as long as four months before death; in rheumatic fever during the height of the disease in 5 of 9 attempts; in peliosis rheumatica in 2 cases, and occasionally from arthritis deformans. Hemolytic streptococci were obtained from three cases of puerperal sepsis; the *Streptococcus viridans* in two cases of chronic infectious endocarditis, while the results of the usual cultures suggested the "bacteria-free stage" (Libman) of the disease. Diphtheroid-like organisms have been isolated from the blood during the febrile period in four cases of Hodgkin's disease, and the same organism from the blood as from the nodes in two of three cases of erythema nodosum in which blood-cultures were made. Diphtheroid bacilli have been isolated from the blood in four cases of severe infections resembling rheumatism; the *Bacillus aerogenes capsulatus* (*B. welchii*) from the blood in one case of bronchopneumonia, one case of acute rheumatism, and in leukemia.

Streptococci corresponding to those which I have isolated previously from the joints have been isolated from glands draining the involved joints in twelve cases and *B. welchii* alone or in conjunction with streptococci in four of twelve cases of acute articular rheumatism.

In 54 cases of arthritis deformans one or more glands draining the joints have been examined in each case. Non-hemolyzing streptococci producing usually no distinct green on blood-agar plates and often showing a marked preference for anaerobic conditions in the primary culture but otherwise resembling *Streptococcus viridans* have been isolated 32 times; staphylococcus 5 times; an organism resembling *B. mucosus* 3 times, *Micrococcus catarrhalis* and the gonococcus once each, *B. welchii* in 14 cases, and diphtheroid bacilli in 5 cases. In 7 cases the cultures remained sterile. In both rheumatic and deforming arthritis the same organisms have been isolated simultaneously from the fluid or capsule of the joints and the excised gland.

A diphtheroid bacillus showing a wide range of preference for oxygen in the different cases has been cultivated in all of some 40-odd cases of Hodgkin's disease; a staphylococcus in 17; *Streptococcus viridans* in 7; *B. welchii* in 14, and an unidentified Gram-negative motile bacillus in 6 cases.

A non-hemolyzing, sometimes green-producing (blood-agar) streptococcus has been obtained from the depth of the tissue in 16 of 21 chronic indurated duodenal and gastric ulcers, and from the small glands adjacent to the ulcer in 4 of 5 cases. A staphylococcus-like organism was present usually in smaller numbers in 16; *Staphylococcus aureus* only once. The base of the ulcers was either entirely sterile or contained only a small number of bacteria and yeast-cells. The number of colonies of streptococci was roughly proportionate to the gross or microscopic evidence of inflammation. Only one perforating ulcer was examined and this showed the largest number of colonies of streptococci. The negative results obtained were in ulcers which seemed to be practically healed. *B. welchii* was isolated from the ulcers in 6 cases and from the adjacent glands in 3. Three ulcers showed diphtheroid bacilli, 4 yeast-cells, and in a number there were found a few colonies of a large Gram-positive aerobic bacillus, probably belonging to the *subtilis* group. The colon bacillus was found only once in the simple ulcers excised at operation, but was present in large numbers in one examined shortly after death and in small numbers in two out of three ulcers the seat of carcinoma.

Streptococci quite similar to those from the ulcers have been isolated in pure culture from the excised tissue of the gall-bladder in cholecystitis in one case and from the center of gall-stones in 4 of 7 cases. *B. welchii* and *B. coli* were found together with the streptococcus in the gall-stones in one case and a bacillus resembling closely the typhoid bacillus in another.

A polymorphous, sometimes clubbed, diplobacillus was obtained in pure culture from excised nodes in each of 7 cases of erythema nodosum; from a cervical lymph-gland draining an infected tonsil in one case

rapid increase in size recently; tachycardia for year or longer; dyspnea of exertion; nervous and emotional; frequent subjective flashes of heat; prominence of eyeballs for a few weeks; loss of 15 pounds in weight in last few months; frequent sore throat; tonsillotomy three years ago. Examination: General pallor; moderate exophthalmos and lagophthalmus; tonsil stumps large and infected; teeth good, some dentistry; thyroid enlarged, symmetrical and firm; heart normal size, rapid, 100 to 120, somewhat irregular, tones pure, but snappy; tremor of extended fingers; reds, 3,300,000, whites 8,300, hemoglobin 60 per cent.; blood-pressure 125 systolic; urine, normal. Treatment: Tonsillectomy; rest; hematinics and plentiful food. May 20, 1914, discharged to family physician, much improved. June 18, 1914, family physician reports the patient much improved. Goiter much diminished in size. General condition excellent.

Case 7.—Miss M. K., aged 24, telephone operator, U. S., admitted April 18, 1914. Complaint: Chronic arthritis of joints of fingers; frequent tonsillitis; goiter; occipitofrontal headache, fainting attacks and nervousness. Examination: Well-nourished; good color; tonsils large, fissured and infected; four lower teeth show alveolar infection (roentgenograms); swelling, soreness and stiffness of many joints of fingers; heart, lungs, urine and blood normal. No symptoms of hyperthyreoidea. Treatment: Tonsillectomy, extraction of teeth with infected roots, autogenous vaccination with streptococci (*S. viridans* and *S. hemolyticus*) obtained from tonsils and dental canals. May 10, 1914, discharged much improved. June 6, 1914, returned and reported ability to return to work. Goiter practically disappeared. June 18, 1914, patient at work. Goiter about one half original size. General condition good. Arthritis of fingers much improved.

Case 8.—Miss M. M., aged 21, telephone operator, U. S., admitted May 18, 1914. Diagnosis: Goiter; tonsillitis chronica. Complaint: Frequent sore throat, hoarseness; goiter of unknown duration, intermittent enlargement of lymph-nodes of anterior triangles of neck; nervous and emotional; lessened strength and endurance. Examination: Moderate exophthalmos and lagophthalmus; tonsils enlarged, fissured and infected; teeth, no visible infection, much dentistry; thyroid enlarged, chiefly the isthmus and right lobe; a few palpable submaxillary lymph-nodes; heart normal, 68 to 80; slight tremor of extended fingers; reds, 4,800,000, whites 10,300, hemoglobin 75 per cent.; blood-pressure 120 systolic; urine normal. Treatment: Tonsillectomy and rest. May 25, 1914, discharged to family physician much improved. June 18, 1914, family physician reports condition improved with the thyroid almost normal size.

Case 9.—Miss E. S., aged 23, U. S., admitted May 19, 1914. Diagnosis: Exophthalmic goiter; tonsillitis chronica; impacted molar teeth. Complaint: At 17 became nervous and emotional, had tachycardia, loss of weight and strength, muscular tremor, moderate goiter, sweating, diarrhea, etc. Diagnosis of exophthalmic goiter and operation advised by home physician. Instead took rest cure. Improvement. Since then invalid with periods of improvement alternating with relapses. Now has tachycardia with irregular beating; nervousness, with hot flashes, insomnia and varying emotions; muscular tremor, generalized; profuse perspiration; diarrhea; occasional nausea and vomiting; weakness; loss of weight; exophthalmos and goiter. Had acute rheumatism at 12; sore throat on rare occasions. Menses irregular. Examination: Fairly nourished. Moderate exophthalmos; teeth, no caries, impacted molars (roentgenogram); tonsils large, buried, smooth exposed surfaces; thyroid visibly and palpably enlarged; heart, left border dulness 11 cm., rate 100 to 120, rhythm, somewhat irregular, tones pure; tremor marked; temperature range 98.6 F.; carbohydrate tolerance to glucose gm. 50.0 normal; urine normal; blood-pressure 140 systolic; reds 4,500,000, whites 9,000, hemoglobin 80 per cent. Treatment: Tonsillectomy. Removal of impacted teeth. Rest. June 3, 1914, discharged to family physician. Goiter and symptoms of hyperthyroidea practically disappeared. June 16, 1914, a letter from the patient's sister states marked condition of general improvement. She says patient expresses surprise at the disappearance of uncomfortable sensations which had existed so long that she had thought them natural phenomena.

Case 10.—Miss G. O'B., aged 23, telephone operator, U. S., admitted May 20, 1914. Diagnosis: Exophthalmic goiter; tonsillitis chronica; abscess alveolaris; anemia secondary. Illness began one year ago with severe tonsillitis. Soon noticed goiter with extreme nervousness, muscular tremor, tachycardia and a complete nervous collapse in March, 1914. Examination: Well-nourished; pale; nervous; marked muscular tremor; no exophthalmos; symmetrically enlarged thyroid gland; three carious teeth with alveolar infection (roentgenogram); infected faucial tonsils; subfebrile temperature; pulse 95 to 130, heart-tones normal; blood: reds 2,580,000, whites 13,600, hemoglobin 40 per cent.; blood-pressure 125 systolic; urine normal. Treatment: Tonsillectomy; extraction of teeth with alveolar infection; hematinics; rest and good food. Result: Rapid improvement in goiter and symptoms of hyperthyreoidea. June 18, 1914, patient continues to improve in a general way. Anemia less. Goiter still palpable, but symptoms of overaction of thyroid practically gone. This patient is the only one of the series of women who has not received vaccines.

No thyroid gland tissue was examined. Dr. E. C. Rosenow has recently made cultures from the deep tissues of many goiters, removed surgically in the treatment of exophthalmic goiter. Without exception he has been able to isolate and grow a streptobacillus of characteristic qualities. He is making experiments with the organism by animal inoculation and will make a report soon.

Farrant[10] has investigated the pathologic changes of the thyroid in disease. He finds that certain microorganisms and certain toxemias may cause either a chronic hyperplasia with colloid or a complete acute hyperplasia. In the acute type the *B. aerogenes capsulatus, B. diphtheriae, B. dysenteriae* (Asylum, Shiga and Flexner types), *B. anthracis, B. tuberculosis, B. mallei,* bacillus of tetanus, *Micrococcus catarrhalis, Spirochaeta pallida, Plasmodium malariae,* chronic nephritis, cirrhosis of liver and toxemias due to abrin, ricin and diphtheria toxin produced rapid hyperplasia. Animal inoculation and examination of animal and human thyroids were the basis of the report.

In the chronic type, the coliform bacillus (chr.) tuberculosis, chronic, Malta fever, syphilis, actinomycosis, acute poliocyelitis, rheumatic fever, scarlatina and pernicious anemia were associated with thyroid enlargement. Involution of the thyroid followed the subsidence of the systemic disease.

That Farrant should not find acute hyperplasia in rheumatic fever is probably due to the absence of clinical observation.

THE WIDER APPLICATION OF THE ETIOLOGIC IMPORTANCE OF FOCAL INFECTION

To the now well-known relation of focal infection as a chief factor in the etiology of acute rheumatism, chronic deforming arthritis, gonorrheal arthritis, malignant endocarditis, myositis, myocarditis, septicemia of various bacterial types, tuberculosis, nephritis and visceral degeneration, we may add certain infectious types of thyroiditis, with or without hyperthyroidism, pancreatitis acute and chronic, with or without resulting glycosuria, peptic gastric and duodenal ulcer and cholecystitis.

With the defenses of the body diminished by overwork, exposure to cold, dissipation, insufficient or improper food, unhygienic surroundings, injuries from

10. Farrant, Rupert: The Pathological Changes of the Thyroid in Disease, Brit. Med. Jour., Feb. 28, 1914, p. 470.

former disease, (valvular scar) or trauma, the individual may suffer from acute rheumatic fever, chronic arthritis, myositis, chronic infectious endocarditis, pneumonia, ulcer of stomach, cholecystitis or pancreatitis, respectively dependent on the phase of mutation in pathogenicity, and affinity of the strain of the streptococcus-pneumococcus group in the focus of infection. These principles are important because proper management may (*a*) prevent the systemic disease and (*b*) guide one in the proper treatment of the systemic disease. The recognition and removal of chronic foci anywhere in the body is imperative as a prevention of progressive ill health. Emphasis should be made of chronic alveolar abscess, often unrecognized by the patient. Film roentgenograms of the jaws is often the only means of recognition. A pathologic tonsil is a menace and should be wholly removed. Chronic cholecystitis and chronic appendicitis should be promptly treated surgically. Chronic sinusitis may exist for years and finally be an important factor in the development of systemic disease. Following the removal of the focal infection, adequate individual and general hygiene will improve the body defenses and health will be maintained.

The removal of the focus of infection is demanded as a fundamental principle, in the treatment of the systemic diseases especially of the chronic type. Thereafter the management must be individual, based on the character and location of the infection. The attempt to immunize the patient against the infection must be attempted by restorative measures—food, pure air, passive and active graduated exercise, hematinic and other tonics, optimistic surroundings, etc. Autogenous vaccines may be used with rational reservation.

122 South Michigan Boulevard.

THE NEWER BACTERIOLOGY OF VARIOUS INFECTIONS AS DETERMINED BY SPECIAL METHODS *

E. C. ROSENOW, M.D.
CHICAGO

The bacteriology of most infections as worked out heretofore is largely the bacteriology of the fluids of the body and semifluid exudates. In acute infections a bacteriologic study of the fluids commonly yields trustworthy results, but in many chronic conditions the cultures are usually sterile and demonstration of bacteria in the tissues usually fails.

In this short paper I wish to describe methods for making cultures particularly from excised tissues and from the blood and other fluids in which due regard is paid to the question of oxygen pressure, particularly in the primary culture, and to detail very briefly the results obtained by their use in various infections.

PREPARATION OF THE EMULSION FROM THE TISSUES

The tissues are excised with strict aseptic precautions usually under local anesthesia and cultures made at once, a portion being reserved for microscopic study. In addition to the great care used to avoid contamination from skin or air the surface of the part used for cultures is sterilized by dipping it into boiling water, or even better, into a vigorous Bunsen flame, or seared with a hot blade, then rapidly cooled in sterile salt solution and emulsified in the specially devised sterile air-chamber or "tissue-crusher" shown in the accompanying illustrations. The amount of heat used is determined by the size of the tissue at hand. Whenever possible, pieces of tissue at least 2 to 3 cm. in diameter are used for cultures.

The chamber (Fig. 1) is somewhat similar to the one already described[1] except that it contains a larger mortar and a small-sized meat-chopper.[2] It consists of an air-tight tin can (19 by 23 cm.) containing a large (10 cm.) hole on one end with a flanged rim to which is tied a long-sleeved, heavy, fleece-lined canvas glove; there is a smaller side opening (3 cm.) which is plugged with cotton and a large opening (8 by 12 cm.) at the top which is covered with mica and held in place by circular wires and surgeons' adhesive plaster. The meat-chopper is held in place through a hole at the farther end through which the shaft extends and a hole at the bottom through which a thumb-screw fits whereby it is clamped to a wood extension, fastened to a semicircular wood board nailed to the end. On the inside is fastened a suitable-sized tin can which serves as the mortar holder. The container without the meat-chopper answers very

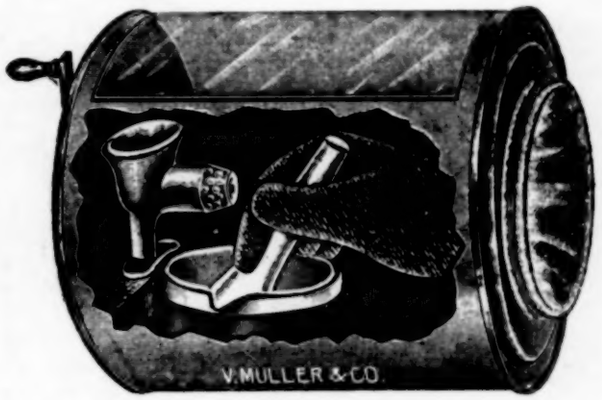

Fig. 1.—Sterile air chamber. The right hand is used inside the apparatus.

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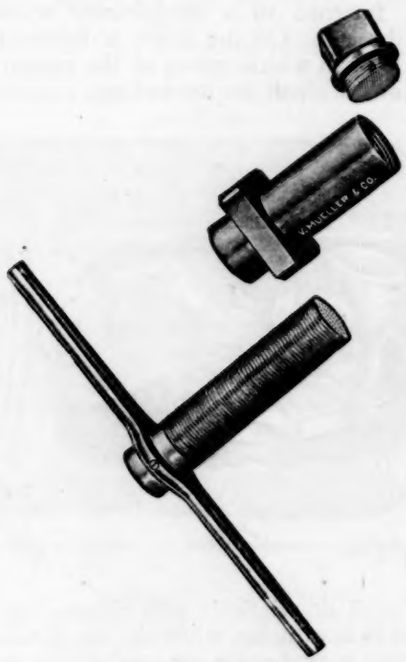

Fig. 2.—Tissue crusher.

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3. The sterile air-chamber may be made in the laboratory, while the tissue-crusher requires a well-equipped machine-shop for its construction. Both may be purchased from V. Mueller & Co., 1779 Ogden Avenue, Chicago.

only a small amount of emulsion is added to some tubes and a large amount to others. In the case of the blood-sediment or joint fluid when only a small amount is at hand, pieces of sterile rabbit or guinea-pig tissue are added to the bottom of the tube if strict anaerobic conditions are desired. A gradient of H and OH ions in the mediums, obtained by superimposing a plus 1 agar or a minus 1 agar and vice versa has also been found useful in some conditions.

Plain serum or ascites, agar and broth, ascites-dextrose-broth in tall tubes, enriched ascites fluid, with or without sterile tissue the surface of Loeffler's serum, plain and dextrose blood-agar slants and plates, kept under aerobic and anaerobic conditions, and at times litmus-milk and ox-bile, and in Hodgkin's disease Dorset's egg mediums are also inoculated. These, while not as favorable culture mediums, have yielded positive results in isolated instances when the shake-cultures in agar were negative. The cultures are incubated at 37 C. for ten to fourteen days before they are discarded. The tubes of dextrose-agar are carefully examined for colonies in a strong light. Smears are made from the water of condensation of the Loeffler's serum and blood-agar slants, of the liquid cultures if turbid and of the sediment always, and from the bottom of the tube of agar even though no colonies are found. Colonies in the depths of the dextrose-agar are examined by breaking the tube crosswise by means of a glass cutter and a red-hot bead at the end of a glass pipet, the surface of the tube being sterilized in the flame just before breaking it. If a positive result is obtained, at least one of the subcultures is made in such a way as to reproduce as nearly as possible the conditions under which the original growth was obtained. This point is particularly important with those strains which show a preference for anaerobic conditions. Search for unknown bacteria was made in smears stained in various ways from the cut surface of the glands and various emulsions and from the depths of the cultures both by staining and with the aid of dark-field illumination.

RESULTS

By this method, which is similar to those employed by Theobald Smith and Noguchi but in which there is afforded not only aerobic and anaerobic conditions but a gradation of oxygen pressure between these two points, a gradation of H and OH ions, and a wide range of nutrition, positive cultures have been obtained frequently while cultures made in the usual way remained sterile.

Thus certain non-hemolyzing streptococci have been isolated from the blood repeatedly when the usual method failed or showed much fewer colonies; in leukemia this has happened as long as four months before death; in rheumatic fever during the height of the disease in 5 of 9 attempts; in peliosis rheumatica in 2 cases, and occasionally from arthritis deformans. Hemolytic streptococci were obtained from three cases of puerperal sepsis; the *Streptococcus viridans* in two cases of chronic infectious endocarditis, while the results of the usual cultures suggested the "bacteria-free stage" (Libman) of the disease. Diphtheroid-like organisms have been isolated from the blood during the febrile period in four cases of Hodgkin's disease, and the same organism from the blood as from the nodes in two of three cases of erythema nodosum in which blood-cultures were made. Diphtheroid bacilli have been isolated from the blood in four cases of severe infections resembling rheumatism; the *Bacillus aerogenes capsulatus* (*B. welchii*) from the blood in one case of bronchopneumonia, one case of acute rheumatism, and in leukemia.

Streptococci corresponding to those which I have isolated previously from the joints have been isolated from glands draining the involved joints in twelve cases and *B. welchii* alone or in conjunction with streptococci in four of twelve cases of acute articular rheumatism.

In 54 cases of arthritis deformans one or more glands draining the joints have been examined in each case. Non-hemolyzing streptococci producing usually no distinct green on blood-agar plates and often showing a marked preference for anaerobic conditions in the primary culture but otherwise resembling *Streptococcus viridans* have been isolated 32 times; staphylococcus 5 times; an organism resembling *B. mucosus* 3 times, *Micrococcus catarrhalis* and the gonococcus once each, *B. welchii* in 14 cases, and diphtheroid bacilli in 5 cases. In 7 cases the cultures remained sterile. In both rheumatic and deforming arthritis the same organisms have been isolated simultaneously from the fluid or capsule of the joints and the excised gland.

A diphtheroid bacillus showing a wide range of preference for oxygen in the different cases has been cultivated in all of some 40-odd cases of Hodgkin's disease; a staphylococcus in 17; *Streptococcus viridans* in 7; *B. welchii* in 14, and an unidentified Gram-negative motile bacillus in 6 cases.

A non-hemolyzing, sometimes green-producing (blood-agar) streptococcus has been obtained from the depth of the tissue in 16 of 21 chronic indurated duodenal and gastric ulcers, and from the small glands adjacent to the ulcer in 4 of 5 cases. A staphylococcus-like organism was present usually in smaller numbers in 16; *Staphylococcus aureus* only once. The base of the ulcers was either entirely sterile or contained only a small number of bacteria and yeast-cells. The number of colonies of streptococci was roughly proportionate to the gross or microscopic evidence of inflammation. Only one perforating ulcer was examined and this showed the largest number of colonies of streptococci. The negative results obtained were in ulcers which seemed to be practically healed. *B. welchii* was isolated from the ulcers in 6 cases and from the adjacent glands in 3. Three ulcers showed diphtheroid bacilli, 4 yeast-cells, and in a number there were found a few colonies of a large Gram-positive aerobic bacillus, probably belonging to the *subtilis* group. The colon bacillus was found only once in the simple ulcers excised at operation, but was present in large numbers in one examined shortly after death and in small numbers in two out of three ulcers the seat of carcinoma.

Streptococci quite similar to those from the ulcers have been isolated in pure culture from the excised tissue of the gall-bladder in cholecystitis in one case and from the center of gall-stones in 4 of 7 cases. *B. welchii* and *B. coli* were found together with the streptococcus in the gall-stones in one case and a bacillus resembling closely the typhoid bacillus in another.

A polymorphous, sometimes clubbed, diplobacillus was obtained in pure culture from excised nodes in each of 7 cases of erythema nodosum; from a cervical lymph-gland draining an infected tonsil in one case

and in mixture from the focus of infection (tonsil and superficial ulcer on anterior pillar) in 2 cases of erythema nodosum.

An anaerobic Gram-positive diplobacillus-like organism has been isolated from the thyroid gland removed at operation in 25 out of 32 cases of goiter (mostly exophthalmic goiter) in man, from the blood on two occasions in a severe case of exophthalmic goiter, and in conjunction with Dr. Moon, in 8 of 12 dogs having goiter. We failed to obtain the organism from the gland in six of seven dogs showing apparently normal-sized thyroid glands, while one showed a few colonies. *B. welchii* was found in all but 6 of the thyroid glands examined. Three of these were normal glands in dogs. A staphylococcus which usually produces hemolysis on blood-agar and grows unusually well anaerobically was found in most of the goiters in those from both man and dog. It is as yet impossible to state whether or not this coccus comes from the skin, although it perhaps does not. Non-hemolyzing streptococci have been isolated in 3 goiters from man and in 2 goiters from dogs.

Cystic ovaries from 25 patients have been examined by this method. Streptococci, often good green-producing, have been found in pure culture in 14, in some instances, both from the cyst fluid and the emulsified tissues; but the cyst content is usually sterile. A partially anaerobic diplobacillus resembling quite closely the organism from the thyroid gland has been found in 4; staphylococci in small numbers in 3; *B. welchii* in all but 5 cases.

SIGNIFICANCE OF THE FINDINGS

The common localization and lesions produced on intravenous injection of streptococci soon after isolation from acute rheumatism, from arthritis deformans, from ulcer of the stomach and from the tissue of the gall-bladder in cholecystitis and the center of gall-stones, together with other facts, suggests strongly that they are not secondary invaders but the important etiologic factor in each of these conditions because the strains from rheumatism commonly produce arthritis, endocarditis, myocarditis and pericarditis; the strains from arthritis deformans, arthritis and myositis but rarely endocarditis or pericarditis; the strains from the depths of ulcers of the stomach often show a striking affinity for the mucous membrane of the stomach and duodenum (dogs and rabbits); while those from the gall-bladder and the center of gall-stones commonly produce cholecystitis. The bacillus isolated from erythema nodosum when injected as isolated showed a marked affinity for the subcutaneous tissue in dogs, rabbits and guinea-pigs, producing localized hemorrhages followed by infiltration resembling the nodes seen in man, the lesions often being symmetrically placed usually near a relatively large blood-vessel. On artificial cultivation and on animal passage the strains lost this peculiar property. In both instances the organism tended to become a streptococcus and on passage it acquired an affinity for the joints, fascia, muscles and endocardium. This fact would seem to afford an explanation of the common occurrence of arthritis and sometimes endocarditis in erythema nodosum and allied conditions.

The almost constant presence of diphtheroid organisms in the glands and their demonstration in the blood in Hodgkin's disease in conjunction with the results of experiments on monkeys by Bunting and Yates and by Negri and Mieremet, and the good results obtained in some cases by the use of autogenous vaccines suggest strongly that these organisms play at least a prominent rôle in this disease; but the fact that other organisms are commonly found also and that diphtheroid bacilli indistinguishable from some of the strains from Hodgkin's disease are found in many other conditions compels one to wait for more experimental evidence before concluding that these bacilli are the real cause of Hodgkin's disease.

The etiologic rôle of infection in goiter is becoming more apparent; enlargement of the thyroid gland has been noted in various infections, particularly in rheumatism; and the peculiar distribution of endemic goiter, and other clinical facts, suggest that the cause of simple and exophthalmic goiter may be due to an infection. The symptoms and the enlargement of the gland, however, have usually been considered toxic in nature and not due to localization of the bacteria in the gland. No one, as far as I can learn, has isolated an organism from the thyroid in a series of cases. The fact that the same organism has been isolated from goiters in both dogs and man, and in the latter apparently in proportion to the degree of symptoms and from the blood, the absence of this organism in normal thyroid glands in dogs, the fact that it lives longer in the thyroid gland than in the kidney and other tissues of dogs following intravenous injection, and that goiter has appeared in two dogs after intravenous injection of this organism, suggest that goiter may be due not only to toxins produced in other regions of the body but to an actual localization in the gland of bacteria. Studies of the chief organism found show that it is probably closely related to the streptococcus group and this may explain why thyroid enlargement is observed commonly in rheumatism and in cases having foci of infection in which the predominating flora is streptococcal.

The significance of the findings of the streptococcus in cystic ovaries is not yet clear. Further experiments on animals are necessary and the immunologic reactions in the various conditions, particularly in goiter and cystic ovaries, need to be worked out before definite conclusions can be drawn. It may be that the organisms isolated are merely secondary invaders. The rather frequent occurrence of diphtheroid-like organisms in the tissues and blood during life is, I believe, significant. They are probably not wholly secondary or harmless invaders.

Altogether the *B. welchii*, or an organism closely related, has been isolated from various tissues in man 103 times and from the blood or joint fluids six times. It has frequently been found in various tissues, such as the thyroid, muscle and kidney of dogs and occasionally in livers of rabbits and guinea-pigs. On account of this surprising finding and because the organism is an anaerobe and spore-bearing, every possible source, especially the serum and ascitic fluids, other than the tissue inoculated has been excluded by control-tests. The common presence of this organism in the tissues of man and the dog (carnivorous animals) and its absence in the rabbit and guinea-pig (herbivorous animals) is, I believe, of significance. It exists in the tissues probably chiefly in the spore form and the growth usually does not result except when the oxygen pressure has reached a certain grade. The fact that the strains grow readily at a certain grade of oxygen pressure without production of gas and that

they produce the characteristic growth with gas formation only under strict anaerobic conditions suggest that under special circumstances (a lowered oxygen pressure, increased virulence or growth in symbiosis with other bacteria perhaps) *B. welchii* may not be an entirely harmless invader.

Finally, whatever the ultimate significance of these findings may prove to be, the common isolation of bacteria from tissues which have been considered sterile is of definite importance, lends support to the contentions of Adami and others that certain ill-understood conditions are due to a low-grade infection and not merely intoxication and calls for an extensive study of the whole question by this or similar methods.

I wish to express my very great appreciation to the numerous physicians, particularly Dr. Billings, who have supplied me with material. The more complete reports are to appear in the *Journal of Infectious Diseases*.

629 South Wood Street.

ABSTRACT OF DISCUSSION

ON PAPERS OF DRS. BILLINGS AND ROSENOW

DR. WILLIAM S. THAYER, Baltimore: There has been no one circumstance in the last fifteen years that has so changed the aspect of the practice of medicine as the recognition of the influence of local foci of infection on the production and course of a variety of general processes of previously uncertain etiology. In the discussion on cardiac disease, Dr. Cabot, in his classification, referred to the "rheumatic" cases, stating that although the term was rough and general, it yet covered those infections which are commonly associated with arthritis as well as cardiac disease. It is well to emphasize this association. When one meets to-day a mitral stenosis or insufficiency he proceeds in a very different way from that in which he did twenty years ago. One's first thought now should be to search for a focus of chronic infection by the removal of which the probability of progression of the malady may be greatly reduced. The proportion of cases of valvular disease of uncertain origin that show old chronic affections of sinuses, of teeth, especially of the tonsils, is very large. I would emphasize also that in tonsilar operations it is most important that the operation be complete. In a very large number of patients who come to me with the statement that their tonsils have been removed, it is easy to demonstrate that most of the lower pole of the tonsil is still present, the crypts often sealed by cicatricial tissue and more dangerous perhaps than before operation. Even in the hands of men whose technic is very good it is not uncommon to see in young people a hyperplasia of small islands of lymphoid tissue which remained after operation. These little islands may later be infected and give rise to all the symptoms formerly experienced.

DR. A. C. GRIFFITH, Kansas City, Mo.: It has been my good fortune since the discovery of the diphtheroid bacilli to see a few cases of Hodgkin's disease. One case in particular occurred in an elderly lady who had been suffering for six or seven years with glandular enlargement. We removed one of these glands and developed the diphtheroid bacillus; also a coccus. Dr. Rosenow has described their clinical characteristics. These organisms are mostly of the aerobic type. The patient was put on autogenous vaccines made from the growth of the organism. The treatment was given in gradually increasing doses until the swelling of the glands began to disappear and the patient was doing nicely. She, however, was persuaded to take up Christian Science. Two weeks later I was called in when she was dying from overinfection or intoxication as a result of the activity of the glands. Necropsy showed that the changes in the glands were those characteristic of Hodgkin's disease; there was the degeneration and softening in the center and the outer harder portion. We used the vaccines three hundred millions to the cubic centimeter. I started in with 0.5 c.c. and increased the dose to 2 c.c. I gave first a dose every three or four days and toward the last 2 c.c. every other day, and the glands were disappearing when the patient left me to follow one of the cults.

DR. FRANK SMITHIES, Chicago: In the study of the histories of nearly ten thousand cases of gastro-intestinal trouble I have been struck by the fact that aggravations of the disturbances were quite common in the spring and the fall. It will be especially noted that this happens in the case of peptic ulcer. It will also be recalled that these seasons of the year include the periods during which epidemic infectious diseases are most prevalent. In view of Dr. Rosenow's investigations, infection of the gastric mucosa by microorganisms might occur at these periods during the course of the disease. In the case of ulcers already existing, reinfection may occur and the process be lighted up. The acid reaction of the stomach is no criterion of its bacterial cleanliness. I have shown this by my study of the findings in more than 7,000 consecutive test-meals. In the majority of the gastric-ulcer cases, there is a possibility of finding foci of infection elsewhere. Studying 1,500 peptic ulcers, I find that in more than 60 per cent. coincident or earlier infection of the gall-bladder or appendix could be noted. In cases of cholecystitis, with or without stones, there was pancreatitis in 12.5 per cent., and in common-duct obstruction, pancreatitis was noted in more than 28 per cent. of instances. It should be emphasized that cleaning up a local focus, as in the mouth, does not guarantee that patients will recover from damage that has already been done in the extensive area of the gastro-intestinal tract.

DR. E. LIBMAN, New York: The occurrence of exacerbations in cases of duodenal ulcer following so-called colds has been particularly emphasized by Hershell of London. In trying to establish a diagnosis between duodenal ulcer and cases of functional disturbance a history of such occurrence is of value. I was interested in Dr. Rosenow's statement that he is not willing definitely to accept the organism described in connection with Hodgkin's disease as being the cause of the disease. Dr. Celler has made a study of a number of cases of various forms of diseases of lymph-nodes and has found the bacillus not only in cases of Hodgkin's disease, but also in other diseases of the lymph-nodes, and particularly in two cases of typical tuberculosis. Apart from that, the *Streptococcus viridans* has been found in lymph-nodes in cases of Hodgkin's disease as well as in other lymph-nodes. Complement-fixation tests made by Dr. Olitsky in cases of Hodgkin's disease have proved to be absolutely negative in all instances. These findings lead us to be careful before accepting the organism as being the etiologic factor in the disease and make us keep in mind the question of latent microbism. There is no doubt that Dr. Rosenow has produced definite mutations in the streptococcus-pneumococcus group. As regards Dr. Rosenow's statement that the organisms from a certain type of infection cause, at least for a time, the same lesions in animals as in man, some work done by Drs. Rothschild and Thalhimer indicate that exceptions occur. They succeeded in 50 per cent. of the inoculated animals, in producing arthritis with recently inoculated strains obtained from cases of subacute endocarditis in man. Pericarditis has been found in animals inoculated with the same organisms and this is a very unusual phenomenon in the disease from which the organisms are obtained.

DR. JAMES M. ANDERS, Philadelphia: These two papers rivet the attention of the profession especially on the head as the seat of infective foci. It has long been well understood that in the case of acute miliary tuberculosis invariably an old focus exists somewhere in the body, most frequently in the lungs, from which the tubercle bacilli come. These papers emphasize the importance of a careful inspection of the mouth and throat as a part of our routine examinations of patients. If foci of inflammation are found there, they should, of course, be energetically attacked without delay. It is important to recollect that if removal of such focal infections fail to bring about a cure of the condition from which the

patient may be suffering, it is not evidence to the contrary, but means, as pointed out by Dr. Billings, that hematogenous metastasis has already taken place. The American Medical Association has its Section on Stomatology, and it would be entirely proper, it seems to me, for the Section on Practice of Medicine to urge, through the House of Delegates the establishment of chairs of Stomatology in our medical colleges.

Dr. De Lancey Rochester, Buffalo, N. Y.: I wish to speak of focal infections especially of the teeth and tonsils. In three cases having teeth infections accompanied by endocarditis in which there were no manifest symptoms in the mouth, but in which the Roentgen ray showed an abscess at the roots of the teeth, when the abscess was removed the symptoms subsided and the patients improved clinically. The organism found was the ordinary streptococcus pyogenes. I have had four cases which have impressed on me the importance of having the tonsils completely removed in cases of infection. The danger of an incomplete operation is illustrated in one case in which the toxic process had gone too far before the trouble was recognized. The patient was a woman who gave a history of rheumatism, multiple arthritis and endocarditis which had been treated in the hospital for two weeks. She improved under the salicylates and got up. Later she had a recurrence, ushered in with a temperature of 104.5 F. and her pulse was uncountable. She gave a history of having had a tonsil operation ten years before. There was also a history of sore throat and an exudate over the tonsils. The condition of the patient was so serious that she could not be operated on. She died of severe systemic toxemia, in all probability due to infection from the tonsils.

Dr. Alfred Stengel, Philadelphia: Dr. Rosenow's statement with regard to the cause or the part played by the organism in Hodgkin's disease was very conservative. He said that we are not sure of the relation of the diphtheroid organism to Hodgkin's disease, but it seems to me that we are sure that this organism is the specific organism of Hodgkin's disease. I have only four cases of such infection to report: one of endothelioma; chronic simple inflammation of the glands; one of lymphoid enlargement in a patient with rheumatoid arthritis, and lastly another rheumatoid case not easily classified.

Dr. J. Birney Guthrie, New Orleans: Has Dr. Rosenow applied his technic in finding the cause of the short fevers of obscure origin in children, which are accompanied by lymphatic enlargement—the so-called glandular fevers? These symptoms of unexplained fever and lymphatic enlargement are quite common in children and it would be interesting to have this method applied to their investigation.

Dr. Harvey D. Wood, Fayetteville, Ark.: Owing to the rapid progress that has been made in our knowledge of the cause of inflammation and infection, I believe the time has come when the definition of the termination "itis" should be made to include infection as well as inflammation. Since listening to Dr. Billings' paper and the following discussion I have been more than ever fully impressed with the need of a more comprehensive definition of this termination. The phenomena of seasonal recurrences and exacerbations of ulcer, due to infection, have been so clearly set forth in this discussion that it gives us a better understanding of many pathologic processes. The infection that comes from the bite of the infected bedbug is now thought by some, who are doing special work on this line, to be the cause of pellagra. This disease has its period of exacerbation in the springtime, when this pestiferous insect begins to get busy. Should this prediction prove to be the true source of the pathology of this disease, there are many persons whose minds will be relieved from the fear of having this malady.

Dr. Frank Billings, Chicago: In our group of workers we know that Dr. Rosenow is dependable. He has an opportunity to study disease clinically. The diphtheroid bacillus has been successfully cultivated from the enlarged lymph-nodes of about forty, and from the blood of five patients with Hodgkin's disease. These five had fever. The histology of the glandular tissues varied from typical Hodgkin's to simple lymphocytomas, lymphosarcoma and tuberculosis. In one lymphosarcoma the organism could not be cultivated. Many of these patients have received the autogenous vaccine subcutaneously in the dosage of 10,000,000 to 1,500,000,000, usually repeated once a week. Two have received the vaccine in large doses intravenously. Used subcutaneously there is no recognizable general reaction. Intravenously, general reaction has been noted; fever, rapid pulse, general discomfort, headache, etc. Practically all patients have also been treated with efficient roentgenization. In the chronic nonfebrile cases the vaccines and roentgenotherapy seem to produce better results than the Roentgen ray alone. We are now preparing a report on the series of patients. Dr. L. Hektoen will report the histopathology of the glands, Dr. Rosenow will give the bacteriology and I shall prepare the clinical data. We are now attempting to immunize a horse with mixed strains of the diphtheroid bacillus. If successful we shall add the serum to the treatment.

Dr. E. C. Rosenow, Chicago: One word as to the importance of foci of infection other than those of the mouth. I recently saw a patient in Dr. Billings' service who had a rheumatic endocarditis, pericarditis, etc., which apparently was the result of an infected ingrowing toe-nail. The toe was operated on, the streptococcus isolated and the disease reproduced in dogs and rabbits. Another patient had a severe rheumatism including pericarditis and endocarditis which began ten days after a crushing injury of the thumb. Again the disease was reproduced with the streptococcus isolated from the wound on the thumb. I am sorry that I am not prepared to say what the cultures of the glands show in the short fevers in children with glandular enlargement. I believe that the glands in these cases contain bacteria which are the cause of the disease. Streptococci were isolated from the glands in seven of the cases of Hodgkin's disease. It is quite well known that ulcers heal more quickly in the cardiac end of the stomach than in the pyloric end or duodenum. This is generally believed to be due to mechanical causes, but if streptococci play a rôle in the etiology of ulcer, as seems likely, why might not this be due in part to a greater bactericidal power of the mucous membrane of the former because acid-secreting, than that of the pylorus and duodenum in which no acid cells are present? The infectious nature of ulcer would best explain the seasonal exacerbations and the recurrences which come without known cause, the recurrences taking place when the immunity of the blood from a previous attack has disappeared. The most important factor in the management of ulcer of the stomach—the recognition and removal of various foci of infection—has been overlooked in the past. Proper regard of this point should reduce the incidence, percentage of recurrences and earlier healing of ulcer of the stomach and duodenum.

Good Roads Prevent Disease.—Few persons, on first thought, would see any possible connection between good roads and good health. Yet the State Board of Health of Kansas says that good roads can and will prevent disease. How? By the removal of weeds and trash. Weeds and trash prevent the prompt evaporation of moisture and promote retention of ground water. These make ideal breeding spots for mosquitoes, flies and other disease carriers. . . . Good roads also prevent disease by providing good drainage. Many farms have no means of drainage except by ditches along roadways. Open ditches, clear of brush and debris, with hardened surface and proper fall, afford these farms the opportunity of ridding themselves of many a stagnant pool. . . . Road-oiling in itself is destructive of insect larvae, especially mosquitoes—a well-known fact. Dry roads offer pedestrians and notably children who are compelled to walk to and from school, dry shoes and feet. . . . Good roads are active disease prevention agencies, aside from their financial and commercial value.—*Monthly Bull. Ohio State Board of Health.*

GASTRO-INTESTINAL STUDIES

II. THE FRACTIONAL STUDY OF GASTRIC DIGESTION WITH A DESCRIPTION OF NORMAL AND PATHOLOGIC CURVES*

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AND
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For years the experiments of Pawlow[1] and his school seemed to be the last word in the study of digestion, and the results which they obtained on dogs with fistulas and lesser sacs were unqualifiedly applied to man. With the exception of comparatively isolated instances such as that of Alexis St. Martin and others, the only information regarding the human stomach was obtained by means of the stomach-tube and Roentgen-ray examinations.

Owing to the bulk of the stomach-tube and the marked discomfort occasioned by its use, it was impossible to follow the whole cycle of digestion and estimate step by step the exact changes which took place in the stomach after the introduction of a definite stimulus such as various foods. It is true that Hayem[2] was tireless in the application of the tube and attempted to remove specimens at intervals; but the irregularity of these periods and the inability to obtain subjects who would submit patiently to the repeated introduction of the tube were not the least among its objections. The wonder is that he accomplished as much as he did.

Fundamentally we have accepted Pawlow's statements until most of them have become unquestioned, but there is much to be said against results obtained by his procedures. Bourget,[3] the French clinician, is not the only one who protests energetically against the application *sans question* of the results of animal experimentation to man. He says that the physiologist has a tendency to forget that the results which he registered are due to a function perverted or impaired by operative trauma such as fistulas or diverticula. The clinician should take them seriously into consideration, and study them with care, but by no means conclude that they are to be accepted unquestioned. Says Bourget, furthermore, "The physiology of digestion will not make any real progress from a clinical aspect until we have learned to use the sound to determine digestion under the most diversified conditions, but always with the stomach non-traumatized." Much can be said on the basis of this work to support that contention.

We have used a method which one of us[4] devised and which has been described elsewhere by which it is possible to follow the entire cycle of gastric digestion with practically no discomfort and by which it is possible at any given moment to draw off any or all of the juice secreted in sufficient quantity to perform the necessary chemical examinations. We have already discussed[5] the inadequacy of the ordinary stomach-tube and substantiated the statements of Harmer and Dodd[6] that the stomach-tube does not remove completely the gastric contents. The principle of our tube is entirely that of gravity and the tip is sufficiently heavy to seek the lowest portion of the stomach. Furthermore, it is slotted in such a way as to permit the aspiration of a representative sample of the gastric juice. These perforations represent the maximum bore of the rubber tubing. The instrument is inserted[7] and left in the stomach for hours until the gastric cycle is completed.

We commenced our studies on healthy medical students and later performed the same test on hospital patients. Our studies represent in all over 100 cases. We used the straight Ewald meal consisting of two pieces of toast and 10 ounces of tea, 2 ounces of which were reserved to wash down the tube, although this was not necessary. The tube was introduced at the close of an Ewald meal and specimens collected every fifteen minutes. (During the first fifteen-minute period, specimens were collected at five-minute intervals.) This collection at fifteen-minute intervals was continued until the close of digestion, which was marked as pointed out elsewhere[5] by (1) the failure to aspirate any further material; (2) the character of the preceding specimens; (3) the character of the murmur elicited by inflating through the tube and auscultating over the stomach, and (4) lavage, which enabled us to determine the presence of any food residues and their quantity. At first 10 c.c. specimens were obtained, but unless this material was thick, it was found that from 6 to 8 c.c. were sufficient for analysis.

Our method of analysis was that of Bourget's.[8] The filtered material was collected and 5 c.c. measured off with an Ostwald graduated pipet. Titration was performed with hundredth-normal sodium hydroxid, phenolphthalein being used as an indicator for total acid and dimethylaminoazobenzene and the Sahli iodin method[9] for free acid. The pepsin determinations were made by diluting 1 c.c. of each sample with 9 c.c. of 0.2 per cent. hydrochloric acid in a test-tube and adding Mette tubes prepared by the Christiansen[10] method. The entire series of tubes was placed in the incubator for twelve hours, and the quantity of albumin digested was read off with the aid of a steel scale graduated in millimeters, and a dissecting-microscope.

Medical students absolutely free from any general or gastro-intestinal manifestation were selected as subjects and curves constructed from the data obtained as indicated above. It soon became evident that there was no such thing as a specific isolated curve, deviation from which indicated some pathologic condition. The following phases were considered of importance in the interpretation of the curve:

1. The period of "ascension." This usually occupied the first thirty minutes and indicated the rapidity and intensity of the response to a known stimulus.
2. The character and height of the high point or "acme," whether (*a*) accelerated or (*b*) retarded, and whether (*a*) abrupt or (*b*) sustained.
3. Period of descent or decline.
4. The character and modification of the food residues.

* From the Laboratory of Physiological Chemistry of Jefferson Medical College.

1. Pawlow: The Work of the Digestive Glands, 1910.
2. Hayem: Maladies de la tube digestive, Brouardel and Gilbert, 1905.
3. Bourget: Maladies de l'estomac, 1913, Ed. 1, p. 3
4. Rehfuss: Am. Jour. Med. Sc., June, 1914, p. 848.
5. Rehfuss, M. E.: Bergeim, Olaf, and Hawk, P. B.: Gastro-Intestinal Studies: I. The Question of the Residuum Found in the Empty Stomach, THE JOURNAL A. M. A., July 4, 1914, p. 11.
6. Harmer, T. W., and Dodd, W. J.: Sources of Error in the Use of the Stomach-Tube for Diagnosis, Arch. Int. Med., November 13, 1913, p. 488.
7. Rehfuss: New York Med. Jour. (to appear).
8. Bourget: Maladies de l'estomac, 1912, p. 57.
9. Sahli: Diagnosis, Ed. 1913.
10. Christiansen: Ztschr., 1912, xlvi. 257.

The significance of all these points can be developed only in the course of a large number of cases, and the importance of many points is still obscure. We can simply go on record as registering facts which we observed and attempt to interpret them to the best of our ability.

We found that healthy medical students reacted to the Ewald meal in one of three ways:

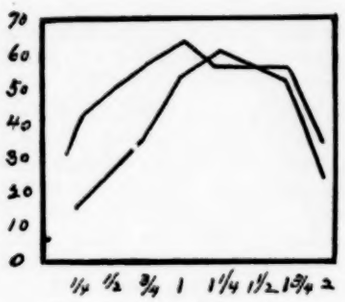

Chart 1.—Isosecretory curves.

Chart 2.—Isosecretory curves. Solid line, total acidity; broken line, free acidity.

TABLE 1.—ANALYSES IN TWO CASES OF THE ISOSECRETORY TYPE

Case 1

Time	Total Acidity	Free Acidity	Mette
5 min.	20.0	10.0	2.2
10 min.	30.0	15.0	2.25
¼ hour	44.0	....	....
½ hour	50.0	34.5	....
¾ hour	57.0	39.0	....
1 hour	62.5	47.5	3.24
1¼ hours	55.0	41.5	3.24
1½ hours	34.5*	23.5	....
1¾ hours	56.5	40.5	4.41
2 hours	30.0	19.5	2.56

Case 2

Time	Total Acidity	Free Acidity	Mette
20 min.	14.5	6.5	0.04
30 min.	41.5	31.5	3.24
¾ hour	40.0	29.5	4.00
1 hour	53.5	42.5	5.76
1¼ hours	51.5	38.5	4.84
1½ hours	48.5*	38.5	5.60
1¾ hours	....	....	....
2 hours	42.0	29.0	7.84
2½ hours	39.5	21.5	7.29

The asterisk (*) indicates passage of the tube into the duodenum which had to be controlled.

1. The "isosecretory" type shows a steady rise, high point, in terms of tenth-normal sodium hydroxid, 60, usually sustained for from half an hour to an hour, and then a gradual decline with total disappearance of the food residues in from two to two and one-half hours.

This curve is usually steady and unbroken; its high point is usually rounded and not abrupt, and is to be found in the neighborhood of one hour. Charts 1 and 2 represent such cases. The results of the analysis of two cases are given in Table 1.

2. The "hypersecretory" type shows a rapid response to stimuli, often a marked change in the acidity even of the five-minute samples, rapid increase in acidity, high point from 70 to 100 or over, either sustained or abrupt, and a slow decline or none at all in the usual time. The food left the stomach in normal time from two to two and one half hours, but even after the passage of all food material there was often encountered an outpouring of pure gastric juice for half an hour, one hour, or even several hours. This finding, which was obtained in many cases, is so pronounced and distinct that we call it a "continued digestive secretion" in contradistinction to "hypersecretion," because it occurs in normal symptomless persons. This type we call the "hypersecretory" type because of the general tendency of the acidity to assume exaggerated proportions.

Charts 3 and 4 are representative of this type, and the results of the analyses of two cases are given in Table 2.

These represent but two of a series of such curves in which the tendencies described were pronounced and the "continued" secretion was quite prominent. Several cases in which the acidity approached that seen in the isosecretory type likewise showed this phenomenon.

3. The third or "hyposecretory" type is similar to the first, but there is usually a slower ascent, slower response to stimuli, and a high point from 40 to 50. Digestion is usually completed in two and one-half hours. This is the type least frequently encountered. Instances are given in Chart 5 and Table 3.

A consideration of the curves from the examination of normal persons indicates that there is no normal curve which will hold for all cases. We believed that there might be such a curve but found that men in every way free from gastro-intestinal disorders reacted in one of these three ways. Two of the hypersecretory type never had a day's illness in their lives, and but one of the entire series, a hyposecretory case, was somewhat prone to constipation. Two of the hypersecretory type were rather heavy meat-eaters, and several of the other two types indulged rather heavily in carbohydrates, but all were healthy, symptomless and free from any such disorder; furthermore, there was no marked variation from the regulation diet.

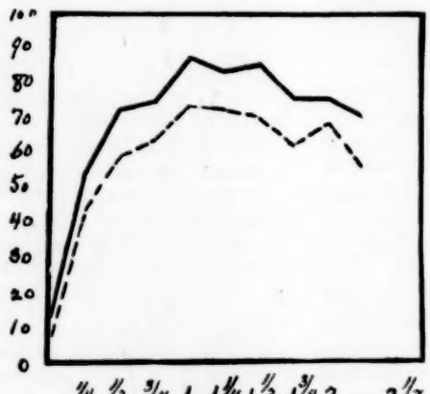

Chart 3.—Hypersecretory curve.

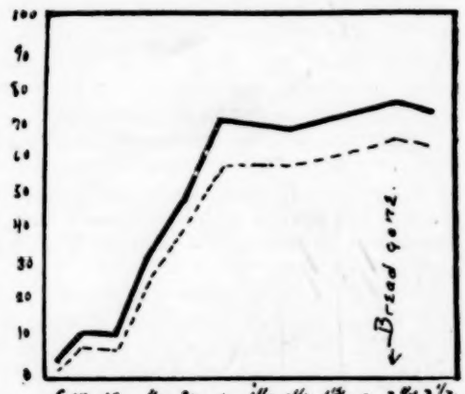

Chart 4.—Hypersecretory curve. Solid line, total acidity; broken line, free acidity.

It will be noted, and study of cases which have not been reported seems to demonstrate, that while normally there are marked variations in acidity, there is little variation in the motor power in health. Even high acidity may occur without any depreciation in

motor tone. These facts are of the greatest importance and contrast strongly with the findings in disease. Furthermore, figures are frequently obtained indicating the strongest acidity (100 and over) when there were absolutely no subjective symptoms. This is worthy of further investigation inasmuch as it is questionable whether hyperacidity *per se* is to be blamed for all the harmful effects credited to it. We

TABLE 2.—ANALYSES IN TWO CASES OF THE HYPERSECRETORY TYPE

CASE 3

Time	Total Acidity	Free Acidity	Mette
5 min.	16.5	11.5	1.21
10 min.	31.0	23.0	1.69
15 min.	53.5	41.0	2.80
½ hour	73.5	58.5	5.76
¾ hour	75.0	62.0	6.25
1 hour	86.0	72.0	....
1¼ hours	82.0	71.0	7.84
1½ hours	83.0	69.0	6.25
1¾ hours	74.5	62.0	6.25
2 hours	74.0	68.0	9.00
2¼ hours*	69.5	55.0	11.56
2½ hours	74.0	60.0	4.41
2¾ hours	82.5	66.0	5.29
3 hours	78.0	65.0	6.76
3¼ hours	80.0	64.5	6.76

CASE 4

Time	Total Acidity	Free Acidity	Mette
5 min.	6.0	3.5	.6
10 min.	12.5	9.0	.7
....	....	....	....
½ hour	35.5	29.5	1.5
¾ hour	51.0	29.5	1.5
1 hour	74.0	43.0	2.0
1½ hours	72.5	61.5	2.4
2 hours	49.0†	43.0	2.3
2¼ hours	79.5	68.5	2.7
2¾ hours	97.0	83.0	2.9
3 hours	99.0	88.0	2.7
3½ hours	74.5	66.0	2.5

† Bile present, indicating the passage of the tube into the duodenum.
* All food has left the stomach.

are engaged in a study of this problem and hope to report further results along this line. The continued secretion is still more difficult of explanation and we believe that we are the first to have demonstrated that this phenomenon is associated with a certain group of individuals, by no means small, who have every right to be described as normal. Alimentary hypersecretion as described by Elsner, Strauss, Boas, Zweig and others is a pathologic state attended usually with definite symptoms, loss of weight, constipation and a

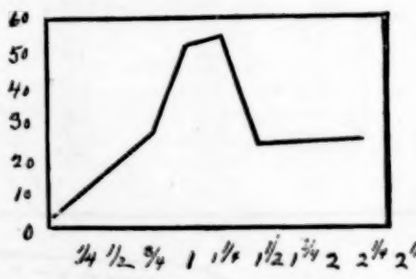

Chart 5.—Hyposecretory type.

great variety of neurotic symptoms and is different from that which we have described which occurs in strictly normal persons. Chronic hypersecretion nearly always, at least in the minds of a great many practitioners points to an irritative lesion of the mucosa, most frequently ulcer. This continued secretion, however, occurs usually after the passage of food-material from the stomach, and further aspiration reveals the presence of an almost pure juice containing little or no food particles but often of high acid values. We believe that this condition is intimately linked with "alimentary hypersecretion" and "chronic hypersecretion," and it is probable that in a person showing the continued secretion, the addition of an associated organic lesion can produce the pathologic secretory states.

An important question might be asked: Can we obtain the same curve on succeeding days in the same person under the same conditions? Our experiments have demonstrated that there are many complex factors regulating the human gastric secretion. That

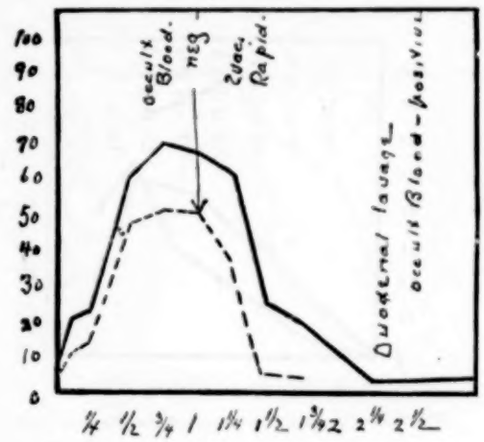

Chart 6.—Curve in a case of duodenal ulcer.

TABLE 3.—ANALYSES IN TWO CASES OF THE HYPOSECRETORY TYPE

CASE 5

Time	Total Acidity	Free Acidity	Mette
5 min.	4.5	1.5	0.1
10 min.	6.5	....	....
15 min.	8.5	3.5	.25
½ hour	21.5	15.0	1.21
¾ hour	28.0	21.5	1.69
1 hour	51.5	44.0	5.29
1¼ hours	54.0	45.0	9.0
1½ hours	24.0	11.5	6.25
1¾ hours	26.0	14.0	....
2 hours	26.0	18.0	9.00

CASE 6

Time	Total Acidity	Free Acidity	Mette
5 min.	0.00	0.00	....
10 min.	0.00	0.00	....
15 min.	6.5	2.5	1.44
½ hour	34.5	24.5	2.89
¾ hour	43.0	31.0	2.25
1 hour	47.5	33.5	4.0
1¼ hours	46.5	30.0	4.84
1½ hours	58.5	39.0	5.76
1¾ hours	55.0	35.0	6.25
2 hours	49.0	33.5	6.25
2¼ hours	35.5	21.0	3.61

physical condition, occupation, diet, environment, mental condition, tobacco, all play a part we are convinced. We find that an Ewald meal if it will not give the exact figures obtained on the preceding day, will show identically the same type of curve, and it is the establishment of the type which is the important thing. This type persists whether the stimulus be an Ewald meal, water or meat, and the resultant curve shows the same general tendencies in the secretory output. This holds for the different stimulating substances which we used. We can therefore account for the variations in acidity figures obtained by clinicians on different days; but if the entire cycle of digestion is followed, the same type of curve will be obtained. We cannot emphasize the importance of this fact too much, inasmuch as we believe that these types indicate certain tendencies. The pepsin content seems to increase up to a certain point, usually with the increase in acidity. That it is not directly proportional to the

acidity is evident from the tables given under the hypersecretory type.

In the analysis of the curves many points must be considered. This method not only gives us a complete picture of secretory activity, but it also enables us to follow the evacuation of the material from the stomach and obtain an accurate index of its motor tone. Pathologically we can obtain an exaggeration or diminution of any or all the phases. We see likewise a prolongation of certain phases, particularly the descent out of all proportion to the normal. Furthermore, the character of the specimens is different, and added factors come into play such as mucus, blood, bacteria, food stagnation from previous meals, presence of organic acids, and distortion of the normal total and free acid ratio, each of which can be followed through the separate specimens. Our studies in pathologic cases are necessarily incomplete. To obtain data of value, many cases must be observed and compared. We feel the necessity of extended study along these lines, but wish merely to indicate the results obtained in certain conditions:

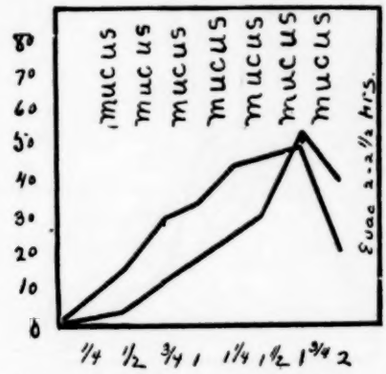

Chart 7.—Curves in two cases of chronic gastritis.

1. Two cases of duodenal ulcer: one undoubted, tender point, hunger-pain, persistent occult blood in the movement, the other with the same symptoms, tender point less pronounced, occult blood in the movements and in the duodenal lavage, not found in the stomach contents. The findings were as follows (Chart 6): (*a*) a rapid rise in half an hour; (*b*) distinct rather abrupt hyperacidity; (c) rapid decline; (d) rather rapid evacuation of food in one and three-fourths hours; (*e*) In one case hypersecretion, and (*f*) no occult blood in the gastric contents. The rapid evacuation is in keeping with the Roentgen findings in 40 per cent. of the cases. These cases are too few to judge the type of curve, but further work should yield interesting findings.

TABLE 4.—ANALYSES IN A CASE OF DUODENAL ULCER

Time	Total Acidity	Free Acidity
5 min.	8.5	4.0
10 min.	21.0	11.0
15 min.	25.0	17.0
½ hour	60.0	48.5
¾ hour	70.0	51.5
1 hour	69.5	51.5
1¼ hours	52.0	36.5
1½ hours	23.5	9.0
1¾ hours	20.0	7.5

2. Eight cases of gastroptosis which seem to indicate that there is no one type of curve or a single tendency in the elaboration of the secretion. On the hypersecretory, isosecretory and hyposecretory conditions are found engrafted depending on the inherent tendency, the acquired and associated pathologic states of the mucosa. In the true Stiller type with generalized myasthenia there is a tendency to a late high point and impaired motility. Frequent small meals and tonic measures, including systematic exercises and a sea voyage, resulted in a total disappearance of subjective symptoms and an improvement in the curve as shown in the following case: The first curve showed a total acidity of 38 at one hour, 58 at one and three-fourths hours, a delay in motility to over three hours and hypersecretion. After the sea voyage, hypersecretion was still present, but the curve had practically reached its height in one hour, with a total acidity of 61, and remained sustained until the cessation of digestion in two and one half hours. There was still present, however, a hypersecretion. We believe that the study of the curve in these cases is of the greatest value from a therapeutic point of view, inasmuch as it enables us to appreciate the tendencies at work.

3. Four cases of chronic gastritis, with mucus in all samples, particularly the later ones, figures within normal range but usually low, evacuation normal, curve unbroken, high point late and slow in appearing (Chart 7 and Table 5).

TABLE 5.—ANALYSES IN TWO CASES OF CHRONIC GASTRITIS

	Case 7			Case 8	
Time	Total Acidity	Free Acidity	Time	Total Acidity	Free Acidity
10 min.	1.5	.0	10 min.	2.0	.0
15 min.	7.5	4.0	20 min.	4.0	.0
½ hour	16.5	7.5	½ hour	5.5	trace
¾ hour	32.0	29.0	¾ hour	12.5	3.0
1 hour	36.0	27.5	1 hour	....	....
1¼ hours	46.0	36.0	1½ hours	30.0	13.0
1½ hours	48.0	37.5	1¾ hours	54.0	32.0
1¾ hours	49.5	40.0	2½ hours	41.5	28.0
2 hours	21.5	....			

In Chart 8 and Table 6 is given the record of a case of hypo-acidity, atony and gastric catarrh showing distinct impairment of motility with very slow and retarded elimination of acid. There was outpouring of little acid and there were no previous food residues.

TABLE 6.—ANALYSES IN A CASE OF HYPO-ACIDITY

Time	Total Acidity	Free Acidity
10 min.	6.0	2.5
20 min.	6.5	4.0
30 min.	6.5	4.0
40 min.	8.0	5.5
50 min.	9.5	6.5
60 min.	10.5	8.5
70 min.	13.5	9.5
80 min.	17.0	11.0
2½ hours	20.0	16.0
3 hours	17.0	14.0

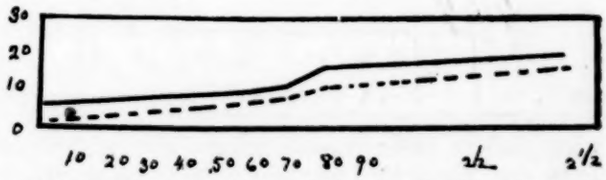

Chart 8.—Curve in chronic gastritis marked by hypo-acidity with impairment of motility.

4. Three cases of cholelithiasis with typical history, in which the attacks were followed by jaundice, one patient was operated on for gall-stones with recurring symptoms. The findings (Charts 9 and 10 and Table 7) were: (*a*) a late hyperacidity; (*b*) normal evacuation; (*c*) rapid decline; (*d*) no microscopic or chemical evidence of stagnation or inflammation, and

(*c*) occult blood negative in different gastric samples and in feces. These findings, together with the anamnesis, should enable one to make the diagnosis.

TABLE 7.—ANALYSES IN TWO CASES OF CHOLELITHIASIS

Case 9, Hypersecretion			Case 10		
Time	Total Acidity	Free Acidity	Time	Total Acidity	Free Acidity
5 min.	5.0	.0	5 min.	5.5	3.0
10 min.	7.0	2.0	10 min.	5.(saliva)....	
15 min.	12.5	8.5	15 min.	25.0	13.5
¾ hour	45.0	23.0	½ hour	28.5	22.5
1 hour	65.0	40.0	¾ hour	51.0	36.0
1½ hours	72.0	46.0	1 hour	70.0	45.0
2 hours	73.0	57.0	1½ hours	75.0	59.0
			2 hours	58.0	44.0

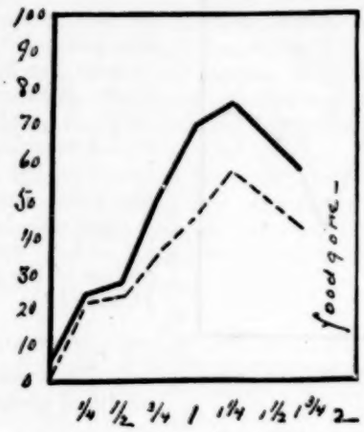

Chart 9.—Curve in cholelithiasis.

The tenderness over the gall-bladder region, the rapid evacuation, lack of gastric findings, symptoms, and pain independent of food, together with jaundice after the attack, enabled us to make a diagnosis in one of the cases. Diagnosis was unconfirmed by operation. In another case, old, operation was performed with removal of stones; drainage was employed, but there was recurrence of symptoms (adhesions?). Tetrachlorphthalein test in one case, although not conclusive, seemed to indicate some hepatic insufficiency.

5. Two cases of suspected neoplasm.

Case 11.—There were pain, some epigastric tenderness four months in duration, loss of appetite and loss of weight, and no palpable tumor, in a woman past 50. This case showed no free acid, a total achylia without presence of pepsin or rennin, no lactic acid, no Oppler-Boas, doubtful occult blood reaction which on subsequent examinations was absent, negative Wolff reaction, albumin was found only in dilutions up to 1 : 80, and antipyrin reaction of the blood-serum was negative. Roentgen examination was absolutely negative as well as a physical examination, and on the basis of these findings the case was not considered one of malignancy. Pain has subsequently disappeared and the patient has gained 6 pounds by treatment. In this case is shown (Table 8, Chart 11) the rapid evacuation of the stomach in achylia.

Case 12.—There was marked subacidity; there was no free hydrochloric acid; enzymes were present, bile was persistently found in lavage, and there was a slow loss of weight, but of several years' duration. The distinct curve, undiminished pepsin content, absence of residue or occult blood indicated absence of neoplasm. Intestinal adhesion was the likely diagnosis, and fluoroscopy by Dr. Pancoast showed an adhesion probably from the old gall-bladder scar to the duodenum.

Subsequent examinations have proved the correctness of the diagnosis, there being a constant reflux of bile in the stomach from adhesions right below the bile-duct.

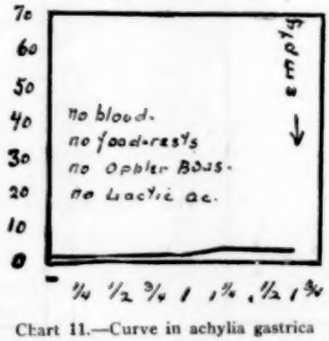

Chart 11.—Curve in achylia gastrica

TABLE 8.—ANALYSES IN CASE 11

Time	Total Acidity	Free Acidity
20 min.	1.0	.0
30 min.	3.0	.0
¾ hour	2.5	.0
1 hour	1.0*	.0
1¾ hours	4.0	.0
1½ hours	4.0	.0

* Saliva in sample.

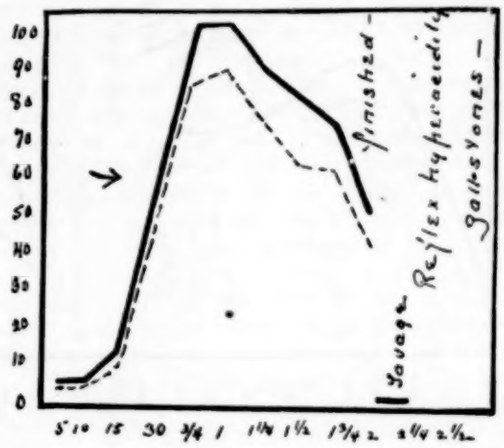

Chart 10.—Curve in reflex hyperacidity with gall-stones.

TABLE 9.—ANALYSES IN CASE 13

Time	Total Acidity	Free Acidity
5 min.	1.0	.0
10 min.	32.0	trace?
15 min.	2.0	.0
½ hour	15.0	.0
¾ hour	29.0	.0
1 hour	6.0	.0
1½ hours	15.0	.0

6. Two cases of carcinoma.

One (Case 13) operated on for annular carcinoma of the pylorus by gastro-enterostomy showed the very irregular results given in Table 9 probably due to the irregular working of the enterostomy. There was a trace of free acid in the second specimen but it could not be titrated. Throughout all the specimens were found blood, lactic acid and Oppler-Boas bacilli in large numbers as well as a variety of other organisms. Wolff test was positive at a dilution of 1 : 320.

The other case was a tumor on the lesser curvature, only partially obstructive, producing slight dilatation, and a gradually increasing curve up to 55; occult blood was distinctly positive.

7. A case (Case 14) with ulcer history and hyperacidity, symptoms improved on medical treatment. This case shows a typical hypersecretory curve, with hypersecretion with delayed motility, fat and vegetable residues from a meal ingested twelve hours previous to examination. Occult blood was negative. The case was probably one of healed contracted ulcer.

A study of this case alone is most interesting as it exemplifies what can be demonstrated by the frac-

tional method. The individual in question had an old ulcer history which was cleared up by medical treatment. At times he has outbursts of hyperacidity. The administration of an Ewald meal at 2 o'clock in afternoon six hours after a small breakfast gave the curve demonstrated in Tables 10 and 11 and Chart 12. At five minutes there is a distinct free and combined acid. This is not due to newly formed acid but to the hypersecretion which was present in minor degree. A new débris and the outpouring of pure acid. Although the stomach was not empty at two and one half hours, it was of interest to see what effect the ingestion of water had in such cases. A new curve commences immediately, having the same general characteristics as the former curve.

Space does not permit us to give examples of the many interesting findings in functional conditions, the significance of which we are still in ignorance. One point was repeatedly emphasized and that was the fact that the ordinary technic yields little information of value compared to this method. In the first place, it by no means records the high point in every instance, and secondly, it yields absolutely no information as to what has preceded or followed that point; in other words, it represents but one point in the ever-changing phases of the gastric cycle (Chart 13).

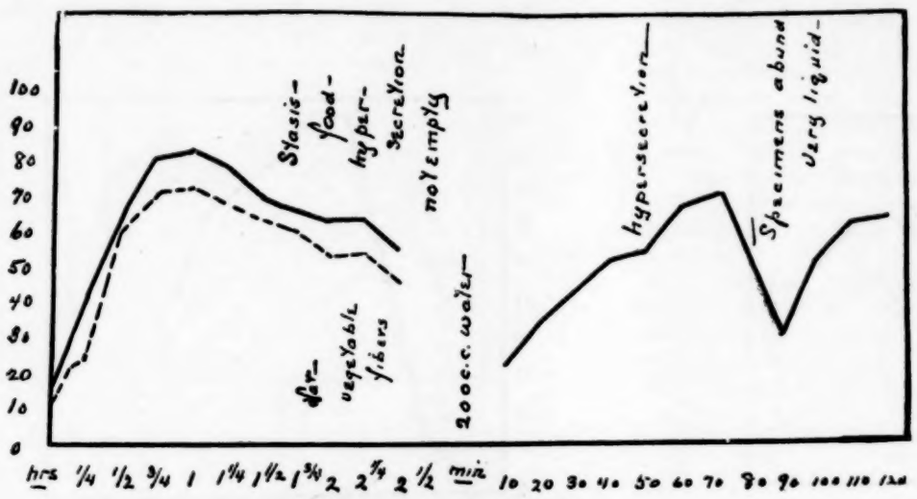

Chart 12.—Curve in healed ulcer.

TABLE 10.—ANALYSES IN CASE 14

Time	Total Acidity	Free Acidity	Mette
5 min.	17.5	13.0	1.00
10 min.	26.5	21.0	....
15 min.	42.0	26.0	1.40
½ hour	67.5	61.0	2.00
¾ hour	82.5	72.0	2.50
1 hour	83.0	74.5	2.50
1¼ hours	79.0	....	....
1½ hours	70.5	64.5	2.20
1¾ hours	67.0	60.0	2.00
2 hours	65.0	54.0	2.30
2¼ hours	64.5	56.0	2.70
2½ hours	56.0	49.5	2.10

TABLE 11.—ANALYSES IN CASE 14 AFTER THE INJECTION OF 200 C.C. OF WATER

Time	Total Acidity	Free Acidity	Mette
10 min.	21.0	19.0	1.50
20 min.	35.0	30.0	1.80
30 min.	32.5*	26.0	2.30
40 min.	51.0	42.5	3.50
50 min.	53.5	45.0	....
60 min.	68.0	58.0	....
70 min.	70.0	60.0	....
80 min.	47.5	39.0	....
90 min.	28.5	23.5	....
100 min.	54.5*	46.0	....
110 min.	62.5	53.5	....
120 min.	63.5	54.5	....

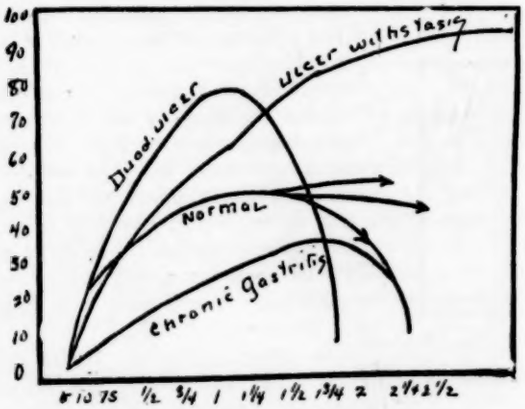

Chart 13.—Tendencies in curves.

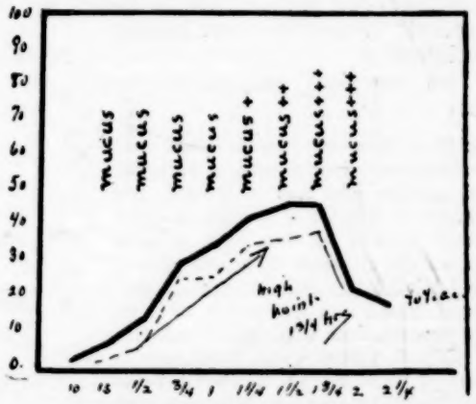

Chart 14.—Curve in chronic gastritis.

CONCLUSION

1. By means of the modified gastric tube, we can study the entire cycle of gastric digestion, recording both the secretory and motor activity.

2. We can construct a curve which graphically records the entire course of digestion.

3. Information as to the amount of the secretion can be obtained at any point by complete aspiration and by the character of the specimens which are obtained.

4. There is no specific curve for the normal person, but three types of curve can be found depending on

curve commences, rapidly attaining its maximum, indicating excessive irritability of the glandular mechanism, and the specimens obtained, very liquid, show the excessive amount of juice poured out. Toward the end of the first curve every specimen shows large amounts of free fat ingested at the meal six hours before, and microscopic examination shows many vegetable fibers ingested about eighteen hours before. The curve falls, but the specimens preserve their appearance with a lessening amount of food

the rapidity of reaction to a given stimulus, the height of the curve and the descent of the curve.

5. These types may be termed, respectively, the hypersecretory, hyposecretory and isosecretory types, depending on their respective reaction to such stimuli.

6. Figures approximating those commonly regarded as hyperacidity are to be found in some period of the curve in a large number of normal persons.

7. A "continued" secretion is described in normal persons which is intimately linked with alimentary and chronic hypersecretion, but can be distinguished from them.

8. The value of this method in various pathologic states is emphasized and a limited number of cases are reported together with their findings.

9. The technic commonly employed for estimating gastric function is entirely inadequate, inasmuch as it indicates but one phase in a constantly changing cycle, and that phase is by no means always the high point in the digestive curve.

10. We would insist on the great advantages of this method which, correlated with the various tests performed on different samples as well as the special tests described elsewhere, enables us to make a more perfect study of the digestive cycle than has hitherto been possible.

We wish to thank Drs. McCrae, Hare and Cohen of the medical staff of the Jefferson Hospital, as well as Drs. Livingood and Wayland, the resident physicians, for their interest and cooperation in this work.

EXPERIMENTAL RESEARCHES IN METHYL ALCOHOL INHALATION *

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Notwithstanding the earnest efforts of the ophthalmologists and the various committees for the prevention of blindness, to disseminate the knowledge of the poisonous qualities and effects of methyl alcohol, it is still a lamentable fact that many members of the medical and legal professions and the vast majority of the laymen, especially the workers using it, are either ignorant of or do not acknowledge the truth. The effect on the eyes and general health from drinking wood alcohol has been proved experimentally in animals, and has been corroborated in clinical practice; but the effect from its inhalation alone on the eyes has never heretofore been demonstrated experimentally.

Although many clinical data have been collated tending to show an effect similar to the one obtained from its imbibition, many doubt and some dispute its power to affect the human organism deleteriously through inhalation alone. The wish to prove this fact, coupled with a desire in the interest of humanity to lessen the number of the blind and to conserve life, by advocating proper preventive or precautionary measures for workers using it, induced us to undertake these experiments.

Before giving them in detail, it may be of interest briefly to refer to the importance of the subject to the body politic.

We have found that there have been about one hundred cases of amblyopia and death from inhalation of wood alcohol recorded in the literature to 1912, and we are of the opinion that this constitutes a very small percentage of the total number of cases which have actually occurred, as a great many either have not been recorded, or have gone unrecognized. Of those that have appeared in the literature, the question whether inhalation alone produced the condition, has usually arisen. In conducting our investigations, we have endeavored to exclude all possibility of the entrance of the wood alcohol into the system except by inhalation, and we feel sure that we have succeeded in producing amblyopia and death in that manner, as we contemplated at the beginning of these researches.

In 1880 about 400,000 gallons of wood alcohol were manufactured, while in 1910 the amount had increased to over 8,000,000 gallons; consequently it appears that the industry has become firmly established. That being true, it is for the chemists and medical profession so to arrange for its use or composition that, while it may serve its purpose in the arts and industries, it shall not levy too heavy a toll on the artisans, and indirectly on the state by causing blindness or death. Its use is extensive, about 2,000,000 people working in trades are using it in the United States alone, and as the foregoing figures indicate, its use in increasing annually.

According to the 1904 United States Census, the following industries and trades were using wood alcohol.

Painters, glaziers and varnishers	278,000 workers
Launderers	386,000 workers
Boot and shoemakers	208,000 workers
Barbers	131,116 workers
Printers and lithographers	155,000 workers
Woodworkers—piano, furniture, etc.	112,000 workers

About 500,000 workers divided among dye-work operators, brass-workers, cabinet-makers, gold and silver workers, harness-makers, hat-makers, leather-workers and tanners, metal-workers, photographers, book-binders, chemists, etc.

The subject is one of increasing importance on account of the new employers' liability law in New York and other states. At present it is not even mentioned specifically as a hazard, but when the importance of the effect of its inhalation is realized, cognizance of this omission must surely follow.

The manufacturers assert that even admitting that commercial wood alcohol is poisonous, the refined product known as Columbian Spirits is not. We have proved conclusively that the refined spirit is quite as dangerous as the unrefined; and indirectly more likely to destroy vision and life on account of the absence of the disagreeable odor to warn one of its presence.

Our original intention was to note the effect of methyl alcohol inhalation in chronic cases, that is, in those which had been exposed to its influence in small quantities over a long period. But the time allowed in which to prepare our paper for the meeting was most inadequate to conduct our investigations along these lines, so we were obliged to confine our attention principally to the more acute phases of the matter under consideration.

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* Read before the Section on Ophthalmology at the Sixty-Fifth Annual Session of the American Medical Association, Atlantic City, N. J., June, 1914.

* Because of lack of space this article is abbreviated in THE JOURNAL by the omission of several experiments. The complete article appears in the Transactions of the Section and in the authors' reprints.

The apparatus used in our investigations consisted of a wooden box which was 32 cm. wide, 47 cm. long and 63 cm. deep (high) with an opening on each end about 1 cm. in diameter. In one end a mica valve was very delicately adjusted, allowing air to pass out. At the other end was an attachment for tubing which could be connected with an air-tank, or copper coil, and which acted as an inlet for fresh air. The top, in which were two square glass windows, could be fastened down by eight thumb-screws. The temperature of the air in the box for the experiments averaged about 68 F., while the hygrometric readings indicated an average of about 60 per cent., thus to a certain extent constituting conditions similar to those in which some of the workers with methyl alcohol use it, for example, varnishers in beer-vats, etc.

The wood alcohol used in the experiments consisted of both the commercial and the Columbian Spirits, and they were obtained from Eimer and Amend, chemists of New York City.

RESEARCHES IN METHYL ALCOHOL INHALATION IN ANIMALS

EXPERIMENT 1.—Acute poisoning in dog. Dec. 3, 1913: A dog, male, weight 4 kg., 700 gm. (about 10 pounds), fed one hour before experiment. At 4:15 p. m. was placed in the box with 2 ounces of wood alcohol on a sponge; inlet and outlet of box open for fifteen minutes during which time dog jumped and barked, then openings were closed. Room temperature 64 F. Interior of box temperature 70 F. Dog at 4:50 p. m. was lying quietly on his side. At 5:30 p. m. box was opened, dog appeared intoxicated; fell on attempt to walk. Moved his head from side to side.

December 5: Breakfast: meat and bread, at 11:30 a. m. At 4:30 p. m. dog was placed in box with 4 ounces wood alcohol on two sponges and box closed. At 4:40 p. m. dog was lying down, abdomen up, breathing heavily. At 4:50 p. m. dog's mouth was slightly open, tongue projecting and body in a position of opisthotonos, abdomen upward, animal moving fore feet feebly. At 5:05 p. m. dog unconscious, respiration 50 per minute. At 5:25 p. m. box opened; dog taken out apparently dying.

December 8: Dog recovered in thirty-six hours, and whereas on the 5th he was dull, he now appeared lively and well. Was placed in box with 5 ounces wood alcohol; box closed at 5:10 p. m. At 5:50 p. m. dog was taken out intoxicated, breathing heavily.

December 9: Dog appeared lively and well, and remained so.

December 30: Dog was placed in box with 5 ounces wood alcohol at 1:50 p. m. At 5:10 p. m. was observed lying on right side with tongue protruding and twitching of fore legs; was taken out of box. Examination: Temperature 90 F.; eye tension, Schiötz tonometer 26 mm. Hg, although its palpation seemed much lower, tonometer reading possibly little higher due to pressure of eyelids and to contraction of lid muscles; respiration 29 per minute, labored; blood-serum not alkaline to phenolphthalein; slightly alkaline to litmus; aqueous humor not alkaline to phenolphthalein; slightly alkaline to litmus; twitching of eyelids; cornea only slightly hazy; pupils 3 mm., no light reaction; fundus of eye, optic disk congested with edema; veins dark and dilated, arteries small.

December 31: Dog apparently dying; respiration 10.

Jan. 2, 1914: Dog found dead in morning.

Remarks.—This dog had four exposures to wood alcohol inhalation, spread over a period of one month. He died after the fourth exposure. It is interesting to note the continuous movements of the head from side to side, which we venture to attribute to an irritation of the semicircular canals of the internal ear.

EXPERIMENT 5.—Effect of methyl alcohol inhalations, with and without ventilation. Dec. 18, 1913, at 4:05 p. m., a dog, weight 3,980 gm. (about 9 pounds), lively, eyes normal, was placed in box with inlet and outlet working. Through inlet air is pumped in at rate of 28 pumpings per minute under 2 pounds pressure. The air passes through a Woulfe bottle, which contains 3 ounces of Columbian Spirits. The vapor is thus forced through a copper spiral or coil placed in a pail of water, under which is a Bunsen burner to heat water and coil. After passing through coil it enters box warmed. At 5:05 p. m. dog was taken out of box lively and apparently unaffected.

December 20: Dog placed in box for twelve minutes. Experiment as before, allowing vapor to pass directly from Woulfe bottle into box without being warmed. Air-pressure 2½ pounds—26 pumpings per minute. At 5 p. m. hygrometer in box, 40. After remaining in box 5⅔ hours dog was lively, showing no apparent effect of vapor.

December 22: Condition as before. Dog in box from 12 m. to 3:30 p. m. having had 5 ounces of Columbian Spirits pumped in with no apparent effect.

December 27: Placed in box at 11:55 a. m. with 2½ ounces wood alcohol pumped in under 2½ pounds pressure; taken out at 5 p. m. lively; no apparent effect.

December 29: Through error of attendant, dog placed in box with 5 ounces wood alcohol without free ventilation. Examination at 4 p. m. found dog lying on right side, with tongue protruding, frothing at mouth, hair moist; was taken out of box. Respirations 20 per minute; deep reflexes absent; unable to stand; comatose.

December 30: Dog still comatose, lying on right side. Respiration shallow, irregular 50 per minute. Temperature 90. Eyes: tension from 6 to 8 mm., both corneae only faintly hazy; sensibility slightly diminished; pupils 3 mm. light reaction; aqueous humor not alkaline to phenolphthalein, neutral to litmus; fundus, optic disks red and edematous; arteries small, veins dark red and dilated. Blood-serum not alkaline to phenolphthalein, slightly alkaline to litmus.

December 31: Dog found dead in morning by attendant.

Remarks.—This experiment is a striking illustration showing the diminished resistance to the inhalation of Columbian Spirits when a very free ventilation was abolished. Moreover, we believe that the repeated exposures to the inhalation of Columbian Spirits (even with free ventilation) did have some effect on the dog, and that the last exposure had a quick fatal effect on account of the previous exposures.

EXPERIMENT 6.—Acute poisoning in rabbit. Dec. 13, 1913, a rabbit, weight 1,600 gm. (3½ pounds), was placed under a large bell jar with 5 ounces Columbian Spirits, and three minutes later was rubbing its nose. Respirations 50 per minute. Every seven or eight respirations spasmodic contraction of diaphragm resembling hiccup. At 4:55 p. m. respirations 32 per minute, with occasional convulsive rapid shortening of the body. Hygrometer 80. Taken from under jar at 5:05 p. m.

December 20: At 4:45 p. m. animal was placed under large jar with 5 ounces Columbian Spirits. At 5:45 p. m. respirations 40 per minute; hygrometer 70; taken out from under jar, not much effect shown.

December 23: At 3:40 p. m. animal under jar with 3 ounces Columbian Spirits. At 4:45 p. m. respirations 38; hygrometer 70; temperature in jar 68. Taken out in good condition.

December 27: At 11:55 a. m. animal under jar with 5 ounces Columbian Spirits. At 12:55 p. m. hygrometer 55; at 1:35 p. m. respirations 57. At 2:30 p. m. respirations 50. At 4 p. m. animal lying on side quietly; breathes regularly and deeply, 22 per minute. At 4:40 p. m. respirations 16;

at 4:45 p. m. respirations 4. Taken out from under jar; cornea hazy; no lid reflex; no light reflex; nose and ears cold. Temperature by rectum 90 F.

December 29: Found dead in morning. Eyes preserved in formaldehyd solution.

Remarks.—The rabbit appeared to be more resistant to the Columbian Spirits than the dog was. Coma and death came only after the fourth exposure, although relatively larger amounts of Columbian Spirits were used. The same spasmodic contractions of the body and diaphragm were noticed as in former experiments.

EXPERIMENT 8.—Acute poisoning in dog. Jan. 3, 1914, a dog, male, weight 5½ kg. (12 pounds), was placed in box at 12:55 p. m., inlet and outlet closed; 5 ounces methyl alcohol commercial. At 1:50 p. m. animal staggered about, frothing at mouth, and at 2:50 p. m. was unable to stand; at 4:10 p. m. lying on right side; respirations 25, deep and labored. Dyspnea at 4:55 p. m.; respirations 24; pulse 150; eyes, cornea clear, sensibility diminished; pupils 2 mm. contracted; no light reaction; fundus, optic disks hyperemic, with edema; arteries small, veins dark, slightly dilated. Tension, left 18.5. Aqueous humor slightly alkaline to litmus, not alkaline to phenolphthalein. Respirations short; inspiration prolonged, expiration about as one to four. Hygrometer 55; temperature in box 66 F. Dog remained in comatose condition from January 3 to 5; was found dead the morning of the 5th, lying in same position as when examined on January 3 and 4.

Remarks.—Death was produced by one prolonged exposure (four hours). The intra-ocular pressure was not low January 3, soon after the exposure, and the animal lived more than twenty-four hours, a fact which confirms previous conclusions, namely, that when the tonometer shows a normal intra-ocular pressure, the animal, though in an apparently dying condition, will live at least twenty-four hours or more, and an intra-ocular pressure below 5 mm. Hg is a sign that death will follow within twenty-four hours.

EXPERIMENT 10.—Changes in the electroconductivity in the blood of a dog produced by methyl alcohol inhalation.

Jan. 17, 1914: Dog, weight 5 kg., 570 gm. (11¼ pounds). Under ether anesthetization 15 c.c. of blood were obtained to which was added 5 c.c. of a 1 per cent. aqueous solution of ammonium oxalate. The electroconductivity was measured by Edelmann's Universal Widerstands Brücke: see technic.[1]

(1) Sample of dog's blood mixed with ammonium oxalate 3 to 1; (2) bridge reading, 39.4; (3) resistance out, 100; (4) temperature 9 C. (48.2 F.) = 65.017 ohms resistance at 9 C.; = 54.615 ohms resistance at 17 C. (62.6 F.).

January 20: Dog kept in box three hours with fumes from 5 ounces wood alcohol. Respirations 42, labored; at end of time lies on right side unconscious. Temperature below 94 F. Eyes: cornea slightly hazy; corneal and pupillary reflex abolished; fundus, edema of disks with dark veins; arteries small.

Blood was obtained from which the bridge reading was 34; resistance out 100; temperature 17 C. = 51.515 ohms resistance at 17 C. Dog killed with chloroform; eyes and optic nerves were enucleated and preserved in formaldehyd solution.

Post-mortem Examination.—Pericardium contained large amount of colorless transparent fluid which spurted out as if under pressure when it was incised; macroscopically heart appeared normal; stomach and intestines were dilated; interior of stomach and pylorus very markedly congested; cupful of frothy mucus found in stomach; spleen very dark indigo blue.

1. Centralbl. f. Electric., 1887, p. 115.

Remarks.—This experiment showed that the electroconductivity of the serum was increased after the inhalation of wood alcohol. The difference of 3.1 ohms resistance obtained in testing the electroconductivity of the blood showed a change which might result from the breaking up of the corpuscles, from an increase in H-ion content, or from any increase in the inorganic salts. An increase in the H-ion content will produce an increase in the acidity of the blood and also conduces to an edema of the tissues. As we find evidence in the blood of acidosis, and a tendency to edema of the ocular tissues, we think that the increase of its electroconductivity, following methyl alcohol poisoning, is due to an increase in the H-ion content of the blood.

EXPERIMENT 11.—Acute poisoning by inhalation in a monkey. Jan. 22, 1914: Female monkey in good health, weight 4 kg. (8.8 pounds), 1 per cent. solution of atropin instilled into eyes. Apparently did not like the bitter taste, as it evidently passed through nasal duct into mouth. It kept expectorating and washing out its mouth; gagged several times as if nauseated. Eyes: pupils dilated quickly and at maximum; fundi, periphery very dark, uniformly pigmented, no abnormalities; disks appear normal and are oval, long diameter vertical.

January 29: Temperature 102 F. per rectum. Monkey placed in box with 3 ounces methyl alcohol spread over sides of box. At 4:25 p. m. air pumped in under 2½ pounds pressure thirty times per minute. Monkey sat in one corner opposite air inlet and no apparent intoxicating effect was produced whatever; at 5:10 p. m., wood alcohol, 1 ounce additional introduced into box; at 5:25 p. m., taken out; monkey acts normally.

February 3: General condition good. At 5 p. m., in box with 3 ounces wood alcohol; same condition; temperature 100.6; at 5:50 p. m., taken out, temperature 100.2 F.

February 4: At 1:35 p. m., in box; temperature 101.4; out at 3:15 p. m., temperature 102; staggering gait, acted dazed and slightly intoxicated. Three ounces wood alcohol used, box with open ends.

February 5: At 2:55 p. m., in box; temperature 102; out at 4 p. m., temperature 100.6. Three ounces wood alcohol used. At 3:35 p. m., animal winking; slight watery discharge from nose.

February 6: At 2:45 p. m., in box; temperature 101.6; out at 3:45 p. m., temperature 101.6.

February 7: At 3:05 p. m., in box; temperature 102; out at 4:30 p. m., temperature 102; 3 ounces wood alcohol placed on cotton, high up, near top of box; monkey not affected apparently by vapor.

February 9: At 3:15 p. m., in box; temperature 102; out at 4:15 p. m., temperature 102; no effect. Wood alcohol 3 ounces.

February 10: In box at 2:55 p. m., temperature 102; out at 4:40 p. m., temperature 100; pulse 160; optic disks hyperemic as compared with first examination; veins dark; pupils dilated, sluggish to light, acts sleepy. Wood alcohol 3 ounces.

February 11: At 3 p. m., in box; wood alcohol 3 ounces; temperature 102; out at 4 p. m., temperature 101.6; staggering gait, weak hind legs; eyes red and watery; drowsy, falls forward in attempting to walk.

February 12: At 10:20 a. m., in box; temperature 101; out at 11 a. m., temperature 99. Wood alcohol 3 ounces.

February 12: At 4:10 p. m., in box; temperature 103; out at 4:20 p. m., temperature 102; vomited, much affected, scarcely able to walk; hygrometer 65.

February 13: At 9:45 a. m., in box with 5 ounces wood alcohol; temperature 100.4; out at 10:45 a. m., temperature 100; drowsy; much affected; very weak, nausea, vomiting. At 4 p. m., temperature 98.8; acts ill, face, gray pallor, refused to eat chocolate, of which was very fond. Keeps quiet; eyes red, pupils dilated, surface of body cold;

wrapped up in covers, sits with head down between fore legs; placed in room by warm radiator.

February 14: At 8 a. m. found dead; body warm, apparently just died. No evidence of painful death. Head removed, eyes enucleated. Necropsy at 5 p. m. macroscopically. Pancreas and adrenals normal; kidneys slightly congested; liver slightly darker than normal, uniform color, no apparent degeneration; uterus and ovaries normal. Heart, pericardium slightly congested; empty; no blood clots nor fluid. Lungs normal, crepitate and float; spleen small, indigo color characteristic of wood alcohol cases; preserved in formaldehyd solution. Large intestines very much inflated containing also mass of feces and a thrombus in the intestinal mucosa. Small intestines not much bloated; empty of fecal matter but in upper part sections or links bloated with occasional dilatation of vessels; stomach contains yellowish-green tenacious semifluid homogenous mass of mucus with small pin-point hemorrhages along vessels, with dilated veins; dura markedly and pia mater slightly congested; spinal cord appeared normal.

Remarks.—The shortness of time of inhalation with free ventilation, and the small amount of wood alcohol used, explain the lack of effect on the monkey during the first two exposures. But this lack of effect was only apparent, as the animal began to show weakness of hind legs, loss of appetite, diarrhea and vomiting after the subsequent exposures. That death followed the last exposure, in which 5 instead of 3 ounces of wood alcohol were used, is very significant. We are convinced that a latent debilitated condition which was not recognized, existed, and the last dose acted fatally as an overdose. The pin-point hemorrhages on the gastric mucosa is one of the characteristics of wood alcohol poisoning.

Experiment 13.—Acute poisoning in dog by inhalation of Columbian spirits, with marked ocular hypotension. Feb. 28, 1914: Dog, weight 5 kg., 900 gm., male. At 8:35 a. m., in box with 10 ounces Columbian Spirits; temperature 102.6; out at 11:15 a. m. In box at 12 m., out at 3:20 p. m, temperature 96. In box six hours; during first hour frothed at mouth; required about one hour to be intoxicated, then comatose; at 4 p. m., respirations 28; auscultation showed short inspiration with long expiration; pulse 88 by stethoscope; temperature below 93. Some fibrillary contractions of muscles of face, mouth, neck, nose and tongue. Intraocular pressure less than 3.5 mm. Hg with Schiötz tonometer. Not much bleeding during enucleation, but more than when commercial wood alcohol was used; bleeding stopped readily (viscosity increased, coagulation time reduced). Died one hour later as expected, using the marked hypotension as an indication of the proximity of death. The examination of the ocular fluids showed a marked reduction in alkalinity.

Experiment 14.—Changes in chemical reaction of serum and aqueous humor. March 3, 1914: Female dog, weight 5 kg., 800 gm. Aqueous humor withdrawn by aspiration under cocain anesthesia. Four-tenths c.c. obtained from left eye. Alkaline: 48 — 47.90 = 0.10; acid: 28.10 — 28 = 0.10; result, neutral to phenolphthalein.

March 5, 1914, 10 a. m.: In box; temperature 101; out at 12:30 p. m. In box 12:45 p. m., with 5 ounces Columbian Spirits; out at 4 p. m., temperature 95. Eyes: pupils 3 mm.; 5 p. m.—O. D., tonometer = 3.5; O. S. = 3.5; (blood examination morning and evening). Died next day as indicated by very low hypotension.[2] Right eye, aqueous 0.4 c.c. Titrated with phenolphthalein as an indicator. Alkaline: 32.4 — 29.5 = 2.90; Acid: 31.10 — 29.95 = 1.15; Alkaline: 2.90 — 1.15 acid = 1.75 alkaline = 4 c.c.; 4.48 tenth normal sulphuric acid to 1 c.c. Normal blood-serum 0.1 acid = 1 c.c. Blood normal 0.5 c.c. Twenty c.c. water. Alkaline: 33 — 32 = 1.00; acid: 31.95 — 31. = .95; alkaline 1.00 — acid 0.95 = .05 alkaline. One c.c. = 0.1 blood tenth normal sulphuric acid to phenolphthalein. Serum taken in morning.

Blood after exposure to Columbian Spirits vapor: Alkaline: 23 — 22 = 1.00; acid 32.85 — 32.00 = .85; alkaline 1.00 — acid .85 = .15 alkaline. One c.c. blood-serum[3] = 0.15 tenth normal sulphuric acid.

Remarks.—As we see, the serum of the dog before inhalation was 0.10 tenth normal sulphuric acid; aqueous humor was neutral; serum after inhalation was 0.15 tenth normal sulphuric acid; aqueous after inhalation was 4.48 tenth normal sulphuric acid. It is very significant that the aqueous shows more acidity than the blood.

Experiment 15.—Control. Feb. 3, 1914: Male dog, weight 3 kg., 300 gm., was placed in box as control with inlet and outlet open (no methyl alcohol vapor added). Animal was kept in box four hours. No apparent effect; was active and lively when taken out.

February 7, 9:55 a. m.: In box, temperature 103.4; out at 1:15 p. m., temperature 102.6; box closed tight, no ventilation; when taken out box contained bad (close) odor. Dog showed no bad effect.

Experiment 16.—Acute poisoning with Columbian Spirits showing acidity of aqueous humor and increased viscosity of blood. March 7, 1914: Male dog, weight 6 kg. (about 12 pounds), in box with 10 ounces Columbian Spirits. At 9:30 a. m., in box; temperature of dog 104; out at 1:45 p. m., temperature 97. At 2:45 p. m., in box; temperature 95; out at 4:15 p. m., temperature 94. Pupil contracted to 2 mm.; no reaction to light; dog comatose; aqueous withdrawn with needle, 0.7 c.c. Alkaline: 24.00 — 23.00 = 1; acid 34.85 — 34.00 = 0.85; alkaline, 1.00 — acid .85 = .15; 0.7 c.c. = 0.15. One c.c. = 0.21 tenth normal sulphuric acid to phenolphthalein as indicator.

Remarks.—As normal aqueous showed neutral reaction, this test is interesting on account of acid reaction as determined.

March 9, 9:30 a. m.: Temperature 96.4; animal comatose; pulse 20; respiration 6. Pupils 2 mm., contracted; no light reaction. Corneal reflex abolished, anesthetic; O. D., fundus hyperemic and edema of optic disk; arteries small, veins not altered in size. At 4:30 p. m., temperature 95 F.; respiration 6; pulse 20. O. D. enucleated and placed in 5 per cent. formaldehyd solution for microscopic examination, no bleeding during operation until optic nerve was severed, then slight hemorrhage occurred, about 1 dram dark viscous blood which coagulated readily. Surface of body cold; respirations slow and deep; eyes closed; tongue dry and protruding; animal comatose; pupil, no light reaction—tonometer 3 by palpation, all reflexes abolished; animal in moribund condition.

March 10: Found dead at 8 a. m. Necropsy: Brain reddish; meninges and substance of brain (white and gray matter) congested. Lungs, pleural cavity contains about 2 c.c. sanguineous fluid, surface of left lung shows numerous small hemorrhages; lung substance slightly edematous and floats on the surface of water. Trachea, normal, not congested. Heart, full of dark blood-clots. Spleen, dark indigo-blue throughout. Liver and bile both darker than normal. Kidneys, bluish-red, very dark, much congested. Adrenals and pancreas darker than normal. Stomach, empty; numerous small punctate dark purple hemorrhages along lesser curvature. Intestines, bloated and empty, purplish-red, similar to lining of stomach.

Remarks.—The symptoms, chemical reactions of the aqueous and post-mortem findings we consider typical of acute poisoning with methyl alcohol.

2. When tension is less than 5, dog usually dies within 24 hours.

3. Blood-serum 1 c.c. = 0.05 increased acid in case after Columbian Spirits.

BLOOD-COUNT IN DOG WITH ACUTE POISONING BY INHALATION OF METHYL ALCOHOL

Before inhalation:	
Erythrocytes	5,700,000
Leukocytes	11,800
Hemoglobin	90 per cent.
Polymorphonuclears	79 per cent.
Lymphocytes	21 per cent.
After inhalation (2½ hours):	
Erythrocytes	7,800,000
Leukocytes	28,600
Hemoglobin	100 per cent.
Polymorphonuclears	99 per cent.
Lymphocytes	1 per cent.

Remarks.—Besides the increase in the erythrocytes, leukocytes, hemoglobin and polymorphonuclears, the very marked decrease in the lymphocytes is of decided interest.

MICROSCOPIC FINDINGS IN EYES OF DOG WITH SUBACUTE POISONING

HEMATOXYLIN EOSIN AND VAN GIESON

1. Choroid gives the impression of hyperemia.
2. Tapetum normal. Retina: rods and cones and the external nuclear layer normal.
3. Outer reticular layer slightly edematous.
4. Inner nuclear layer, normal.
5. Inner reticular layer, slight edema.
6. Ganglion cells swollen and surrounded by clear areas, the nuclei being displaced far toward the periphery.
7. Inner layers of the retina show some edema.

WEIGERT

1. The medullary sheath of the optic nerve takes Weigert's stain rather weakly.
2. A few vacuoles show at the ends of the rods and cones.

The Marchi and Nissl specimens have not been finished, the report of these will be published later.

We consider methyl alcohol to be a true hematotoxic. It has a decided effect on all tissues, producing degenerations, and under certain conditions amblyopia or death. In the eye it produces first a toxic edema of the tissues, which, with the increased viscosity of the blood, interferes with its free circulation. The tissues, being deprived of their nutrition and oxygen, succumb to the effect of the toxin, and degeneration of the ganglion cells and nerve fibers ensues. Acidosis occurs as indicated by the results of the titration of the aqueous and serum, and by the determination of the electroconductivity of the blood.

The tension of the eye in methyl alcohol coma may be a guide as to the immediate outcome of the case, and with more study a scale might be formulated giving exact points at which, as regards life, one could prognosticate complete recovery or death.

Hypotension of 5 mm. Hg or less indicates death within twenty-four hours, while with tension over 5 the animal lived longer; and in these cases a question arises whether or not, if proper treatment was instituted early, the animal would recover.

SUMMARY

Effects of experiments with methyl alcohol inhalation were the following:

1. In nose and mouth copious discharge and frothing.
2. Temperature: marked fall, varying from 1 to 10 degrees according to amount used, method and time of exposure to vapor.
3. Respiration: rate increased, then decreased below normal, being very low just prior to death and ceasing before heart.
4. Blood: increase in electroconductivity due to an increase in H-ion content. Increased acidity, with phenolphthalein as an indicator. Coagulation time reduced, specific gravity increased. Viscosity increased. Erythrocytes, leukocytes, hemoglobin and polymorphonuclears increased and lymphocytes decreased.
5. Necropsy findings: Stomach: empty, mucous membrane congested, punctate hemorrhages. Trachea: pale. Lungs: few minute hemorrhages on surface. Heart: muscle dark, in some cases cavities, empty. Liver: dark. Kidneys: dark purple, congested. Adrenals: hemorrhage in one case. Spleen: dark indigo-blue. Intestines: bloated, small punctate hemorrhages. Brain: marked congestion of the meninges.

Effects on the eyes were: Slight irritation producing blinking, slight haziness of cornea and no inflammation of conjunctiva. Corneal reflex retained in some animals after others had disappeared. Fundus: Hyperemia and edema of the disks, with dilated, dark veins and arteries. Pupil: Moderate contraction in coma, with loss of light reaction. Tension varies with intensity of toxemia, in mild recoverable cases being normal, and in profound coma showing marked hypotension, which when less than 5 mm. Hg by tonometer, indicated a rapid and fatal termination within about twenty-four hours.

Aqueous by titration (with phenolphthalein as an indicator) showed an acid reaction.

In one dog (Experiment 9) blindness was noticed, judging from the animal's collision with objects when attempting to walk, as he could not see to get around them.

Microscopic findings indicate an edema of the tissues with very early signs of beginning degeneration of the ganglion-cell layer of the retina.

In reviewing the results of these experiments, attention is directed to the similarity with those obtained through experimental researches and clinical observations, in the internal administration of methyl alcohol; thus demonstrating its fatal and profound toxicity irrespective of the method of its entrance into the animal organism.

The contentions of the manufacturers that the refined methyl spirits are absolutely harmless are untenable and may cause many sad results among workmen by rendering them careless in taking proper precautionary measures while working with it. Many consider its inhalation harmless under ordinary ventilation. We take exception to that supposition. Most of our inhalation clinical cases result from its toxicity under what are considered by the workmen ordinary conditions. While ventilation will diminish the intensity of the toxicity, the inhalation will not be rendered absolutely harmless thereby. Not ordinary ventilation, but the very best obtainable is required for workers using wood alcohol. At least three times the ordinary air-space allotted per person should be allowed to each workman using it. Placards warning of the poisonous properties of wood alcohol should be posted in conspicuous places about premises where it is used, and hours of labor should be so arranged as to allow for exercise in the open air at frequent intervals. In our subacute cases while the exposure to the vapor for an hour or two daily had not much apparent untoward effect at the time, it certainly did have an effect which manifested itself later by subsequent weakness, trembling and unsteady gait in the intervals between expos-

ures. We are inclined to agree with M. L. Poincaré,[4] who found, after exposing animals to small quantities of vapor of methyl alcohol over a period of from eight to sixteen months, that considerable fatty degeneration of tissues occurred, especially in the liver, heart, muscle, epithelial cells of the uriniferous tubules, some cells of the lungs, and with congestion and slight inflammation of the meninges, and of some nerve centers. He concluded that the vapor of methyl alcohol in small quantities was dangerous.

Physicians often fail to recognize industrial and occupational diseases because of the fact that they are often masked under the form of chronic disorders, which show themselves in obscure diseases of the digestive tract and nervous system, and are attributed by patients to other causes. A number of cases of methyl alcohol poisoning, to our knowledge, have occurred in which the causes of death were given as pneumonia, meningitis, heart-disease, etc. Many of the milder cases have been treated for chronic gastritis, hepatitis, etc. It is not surprising that these unfortunate persons travel from one physician to another searching for relief, when we consider the unfortunate but sad truth that many physicians fail to grasp the true etiology of the cases.

That a difference in susceptibility to methyl alcohol exists in animals and man cannot be denied, and this can be partly explained by the rate of oxidation which takes place in the animal or person. Those in which it is rapidly oxidized experience the least effect, while those with slow oxidation feel the greater toxic effect. Harnack[5] concluded that methyl alcohol in slow oxidation formed formic acid, while in rapid oxidation carbon dioxid and water were formed. Hence when it is rapidly oxidized, it is comparatively (?) harmless, while in slow oxidation, which usually occurs in man, it is exceedingly toxic, as the action of the formic acid thus produced in the animal organism was much stronger than that of the pure formic acid introduced into the body, as in the latter case the organism attempts to convert it with bases and thus gives rise to formates.

In 1869 Richardson[6] suggested that methyl alcohol be inhaled as an anesthetic. He stated that 2 ounces required one hour to produce anesthesia, and pointed out that reflex irritability was not abolished by small doses, that the temperature of the body was reduced 3 degrees and that the danger from its use was practically nil; but when inhalation was forced, death was produced by simultaneous cessation of respiration and circulation. We do not know the time required for him to gain the knowledge contained in the last sentence, but trust that it was during his very early use of methyl alcohol.

It is a well-recognized fact in pharmacology that poisons which affect the highly differentiated nerve-structures very powerfully are proportionately more dangerous the more highly developed the nervous system of the animal is, hence it would be expected that man would be relatively more susceptible to such a poison as methyl alcohol than would the dog or rabbit.

The results of the experiments with the titration method agree with the conclusions formed by Gregnolo,[7] who determined, after the ingestion of methyl alcohol, that there was an increase in the concentration of H-ions in the aqueous and serum, and who stated that these changes go parallel with the morphologic changes in the tissues of the eye. His experiments show, as do ours, that the substances produced in the body by poisoning with methyl alcohol are extremely diffusible and penetrate the eye readily. Our microscopic specimens having been obtained from acute cases show only the stage of edema with an indication in the ganglion cells of one of the first signs of degeneration, the location of the nucleus being far toward the periphery of the cell and most of the cells showing this change. As to the fate of methyl alcohol in the human body, Pohl[8] found that it underwent the same change as in that of the lower animals, its administration leading to the appearance of formic acid which is slowly excreted in the urine.

R. Hunt[9] states that experiments on the physiologic action of methyl alcohol show conclusively that, however pure the preparation may be, it is totally unfit for use as a substitute for grain alcohol in any preparation which is to be taken internally or used externally, or, we add, which may be inhaled in a concentrated form.

USE OF SPECIALLY DENATURED ALCOHOL RECOMMENDED

Only those who have had experience realize the power and intensity of the opposition encountered in endeavoring to obtain proper protective legislation for the regulation of the sale and use of methyl alcohol. When it is possible for one or two members of a legislative body working in the interests of methyl alcohol manufacturers to be able to thwart the wishes of the vast majority of the inhabitants of a great state for a just protective law regulating the safe and proper labeling of methyl alcohol, it is a most unjust and deplorable state of affairs. If the law regulating the sale of specially denatured alcohol could be amended so that manufacturers might be permitted to sell this alcohol to the individual trades using it in the various industries, which would allow them to prepare their own varnishes, etc., obtaining the consistency desired, one of the objections to its present use would be overcome. The variety of denatured alcohol which the law now compels them to use contains a denaturing agent which renders the varnish of soft consistency, and after having dried it scratches very easily, leaving a white mark. If the trades could obtain the denatured alcohol without the objectionable denaturing agent (benzin, pyradin, etc.) it would in a short time supplant the methyl alcohol to a great extent, as it is only one-tenth as dangerous, and if it is used in an exceedingly well-ventilated space, the fatal results due to the toxicity of methyl alcohol would be reduced to a minimum.

The laws relating to methyl alcohol should be enforced with a jail sentence as a penalty attached. Until the gravity of the situation is realized by our law-makers and the judges in our courts, a certain number of manufacturers who value human life cheaply will continue to be a menace to society by disregarding the law and thus causing blindness and death.

4. Poincaré: Compt. rend. Acad. d. sc., 1878, p. 682.
5. Harnack: Deutsch. med. Wchnschr., xxxviii, 358.
6. Richardson: Med. Times and Gaz., 1869, p. 703; London Med. Rec., 1875, pp. 62-77-93.
7. Gregnolo: Klin. Monatsbl. f. Augenh., 1913, p. 157.
8. Pohl: Arch. f. exper. Path. u. Pharmakol., 1893, p. 181.
9. Reid, Hunt: Bull. Johns Hopkins Hosp., xiii, Nos. 137-138.

TREATMENT

While heretofore treatment, except in a very small proportion of the cases of methyl alcohol poisoning with amblyopia, has been considered rather hopeless, the few patients who have improved or recovered, should stimulate us in our efforts to go forward with renewed vigor in search of a plan of medication which shall yield better results. A plan of treatment based on our findings might be summed up in two words, eliminate and stimulate. Eliminators of all varieties should be used, namely, emetics, hydragogue cathartics, diuretics and diaphoretics, calomel, jalap, pilocarpin hypodermatically, hot saline baths or packs, saline infusions and high saline enemas. Stimulants such as strychnin, caffein and theobromin would produce stimulation with diuresis. Ammonia and oxygen inhalation may be used to supply the alkalines and to aid in oxidation. Sodium iodid and alkaline waters would aid in reducing viscosity of the blood and the medicinal treatment may be supplemented by applying heat to the body and extremities.

Credit is hereby given and our sincere thanks extended to Professors Lee, Scott and Pike for their kindly assistance and advice tendered in these researches, which were made in the physiological laboratory of the College of Physicians and Surgeons, Columbia University, New York, also to Mr. Edward Burchell, for his kind assistance in preparing and mounting the microscopic specimens and to Drs. Dixon and Holden for their kindness in examining our specimens.

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ABSTRACT OF DISCUSSION

DR. WARD A. HOLDEN, New York: The clinical symptoms following the inhalation of wood alcohol are so identical with those following its imbibition that it was to be expected that laboratory experiments would give the same results in each. The defense in a recent suit for damages was based on the fact that there was in the literature no experimental proof that the inhalation of wood alcohol could cause blindness. The proof has now been supplied by this painstaking investigation, and an inspection of sections of the retinas of animals so poisoned reveals the same degeneration of the ganglion cells that I found a dozen years ago in animals after the imbibition of wood alcohol. When hundreds of thousands of dollars are invested in an industry it naturally is difficult to bring about safeguards and restrictions that might in any way diminish the sales of the product. The New York Committee for the Prevention of Blindness of which I am a member, believes that in time something may be accomplished. The subject was studied at some length and then a campaign of education was started in the lay press which it was hoped would render it easier to secure the legislation we desired. Hundreds of newspapers took up the matter and many trade journals treated it editorially. The varnish trade and the brewers especially were favorable. We were attacked chiefly by the perfumery-trade journals, which was to be expected, since the great majority of perfumes and toilet preparations are made up with wood alcohol. The National Brewers Association asked us to furnish them an exhibit for their last annual meeting and they sent out to the brewers of the country some thousands of reprints of our literature. For several years past suits for damages for blindness or death in varnishers in the brewery vats have been uniformly successful, and in the last case of which I have knowledge a man in Brooklyn whose eyesight had been impaired received $12,000 from a brewing company in settlement of his claim because they feared to have the case go to a jury. Our efforts to have wood alcohol and preparations containing it labeled poison have failed in the New York state legislature and in the New York City Board of Aldermen. The New York Department of Health, however, of whose advisory council I am a member, is about to add an ordinance to the sanitary code to prevent the use of wood alcohol in any preparation intended for internal or external use by man, and to have wood alcohol and its preparations bear the regulation poison label. The suggestion has been made in the paper that a specially denatured grain alcohol, without benzin or pyridin, be permitted to be used in the preparation of varnishes. This would seem to be a good suggestion. The denatured grain alcohol statute has almost entirely failed of its intended purpose. Denatured alcohol has not come into general use as a cheap and relatively harmless solvent, because of the restrictions thrown about its sale and of the necessity of using denaturing agents which render it more or less unfit for use in certain industries, so that the more expensive and more toxic wood alcohol, sold everywhere without restrictions, is generally used.

DR. HIRAM WOODS, Baltimore: The difficulty in securing the conviction of persons selling wood alcohol is great everywhere. This past winter I had an experience with a man blind from wood alcohol. There was no difficulty in procuring the liquor and showing that it contained 30 per cent. of wood alcohol, sold as Sherwood whiskey. The man who sold it was arrested. The Maryland law provides that anyone who sells wood alcohol to be used as a beverage is guilty of a misdemeanor. The Italian liquor-dealer said he bought it from a jobber and had not himself put the wood alcohol in. Then the judge decided that since the saloonkeeper had said he had not done it, it was up to the State Board of Health to hunt up the jobber and trace it back. This was impossible. The man was acquitted. We should have the legal department of the American Medical Association prepare us a model law. It is a state matter, of course, but it is extremely difficult to get a law fixed without some flaw that leaves these rascals out.

EDGAR B. BURCHELL, New York: On Dr. Schoenberg's suggestion I made an investigation of the blood-count of a rabbit at various intervals after it had been given 8 c.c. of methyl alcohol subcutaneously. The results are shown in the accompanying table. You will see there is quite a difference between the blood picture of the rabbit and the dog. There was no ocular effect at all in the rabbit. By careful physical examination of the rabbit there were no discernible changes in the physical signs. The findings are based on cell-counts of 500 in each instance.

DIFFERENTIAL LEUKOCYTE COUNT

	Normal, Per Cent.	1½ Hrs. after, Per Cent.	2½ Hrs. after, Per Cent.	17 Hrs. after, Per Cent.	20 Hrs. after, Per Cent.	25 Hrs. after, Per Cent.	38 Hrs. after, Per Cent.
Sm. mononuclear	42.4	68.4	66.4	74.8	55.2	77.4	80.0
L. mononuclear..	2.0	4.4	1.6	2.4	3.6	2.8	0.6
Transitional	0.0	0.0	0.6	0.2	0.8	0.2	0.0
Polynuclear	54.8	22.8	28.2	18.4	32.4	16.4	18.0
Eosinophil	0.2	2.0	3.0	2.2	6.2	2.0	0.8
Mast cells	0.6	2.4	0.8	2.0	1.8	1.2	0.6

DR. M. J. SCHOENBERG, New York: We have observed in our animals continuous movements of the head together with uncertain gait which we think are due to some changes in the internal ear, and for that reason I think it would be worth while in a case of such poisoning for some otologist to examine the function of the internal ear, which has never been done before. Another point is that rabbits exhibit greater resistance than dogs to wood-alcohol poisoning by either inhalation or imbibition, which agrees with the findings of Reid Hunt. The findings of Dr. Burchell would explain this somewhat. A dog placed in a box with 5 or 10 ounces of wood alcohol will become unconscious and remain so from twenty-four to forty-eight hours or more. A rabbit resists this. The changes in the blood of the dog compared with those in the blood of the rabbit explain partly why the dog is more sensitive than the rabbit. I think the most important point is the post-mortem findings in animals as compared to

human beings after wood-alcohol poisoning. I had the fortune to be present at a post-mortem on a girl who had drunk liquor containing wood alcohol and died thirty-six hours later. The post-mortem findings were almost exactly the same as in the animals—dogs and a monkey—namely, congestion of the brain, some meningeal hemorrhages, empty heart, hemorrhages in the pleura and pericardium, congestive patches and hemorrhage in the stomach. The patient also complained of impaired hearing several hours before she died.

The examination of the intra-ocular pressure might also help in the prognosis of these cases. We found in the dog that whenever the intra-ocular pressure, after the administration of wood alcohol, is below 5 mm. mercury, the dog died within twenty-four hours. I think that is a point to be considered in wood-alcohol poisoning.

There are two and a half million men working in industries which make and use wood alcohol and I think that there are quite a few of them suffering from the consequences of daily inhalation of wood alcohol. The clinical picture of this occupational disease has not yet been worked out. Judging from our experiments, the clinical symptoms would be nausea, vomiting of blood, headaches, disturbance of vision produced by slight toxic edema of the retina and optic nerve, and they ought to be looked for, together with some changes in the blood. I do not know any one who has made a systematic examination of the blood in such patients.

The greater acidity of the aqueous humor, as compared with that of the serum, after inhalation of wood alcohol is of considerable interest, since this apparent contradiction throws some light on the secretory function of the ciliary body. In view of the facts brought out by this paper, the sale of wood alcohol must be prohibited entirely for the external as well as for the internal use on the human body. I see no reason why wood alcohol should be kept and sold in drug-stores, where people buy it in good faith that it is a "tonic" when used as a rub.

A STUDY OF THE ARNETH FORMULA*

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Since Arneth[1] in 1904 suggested his classification of polymorphonuclear neutrophils as a guide in the prognosis of infectious diseases, while there have been a number of contributions by other authors, their work in applying the classification has been largely confined to tuberculosis, although Kagan[2] has reported his findings in cases of sepsis. In the Arneth classification the polynuclears are divided into five classes depending on the number of nuclei contained within the cell. Taking the blood from a large number of healthy persons he determined that in the normal person a fairly constant relative percentage of the cells was found in each of the five columns (Table 1). An

TABLE 1.—THE ARNETH CLASSIFICATION

Column	1	2	3	4	5
Percentage	5	35	41	17	2

increase in Columns 1 and 2 with a corresponding decrease in Columns 3, 4 and 5, he termed a shift to the left, the normal Arneth index, comprising the totals of Columns 1 and 2, being 40.

Bushnell and Treuholtz[3] adopted the method of adding one half of the number contained in Column 3 to those in Columns 1 and 2. In the series which I now report I have preferred to take as an index the number in excess of the normal count in Columns 1 and 2; thus, a total of 50 in these columns is reported as plus 10. In classifying the neutrophils I have adhered to the rules set by the majority of previous investigators, nuclei being joined by a thread being counted as two, while those connected by a distinct isthmus were counted as a single nucleus. The greatest care has been maintained to avoid the counting of superimposed nuclei, which would result in causing a false shift to the left; when it was extremely difficult to determine with any certainty the column in which to place a cell, it was discarded. In making the differential counts, two hundred cells have been counted, and a similar number of polynuclears used in arriving at the Arneth formula. Wright's stain has been used in all instances with satisfactory results. To facilitate the technic in securing the differential count and Arneth index at the same time, a pad ruled as in the accompanying blank form was used.

1	2	3	4	5

Polys.	Large Lymp.	Small Lymp.	Large Mono.	Eosin.	Baso.	Trans.

Blank form used in recording differential count and Arneth index.

As the white cells are counted a check is placed under the proper heading, the polynuclears put in their respective columns, according to the number of nuclei, with a total of 200 cells counted, the differential count determined and a sufficient additional number of polynuclears counted to bring their number to 200, thus arriving at the Arneth index.

In Series A (recorded in Table 2), consisting of thirty-one unselected cases taken from the surgical service of Dr. Raymond C. Turck at St. Luke's Hospital, a total and differential white cell-count is not recorded. Cases 2, 5, 6, 9, 12, 13, 14, 18, 19, 20, 21 and 27 all showed decided shifts to the left. All of these were septic cases excepting Cases 6, 14, 21 and 27, Case 6 being a case of trifacial neuralgia in an unhealthy person, Case 14 one of exopthalmic goiter, Case 21 a compound fracture of the tibia accompanied by severe shock, and Case 27 a clean hernia, the latter showing a very decided eosinophilia; but the patient escaped from observation before further investigation of a possible causative factor could be conducted. In Case 18, epithelioma of the lower jaw with a plus index of 7.50, the patient succumbed a few weeks after admittance. The other nineteen cases in this series showed practically normal indexes, all of them clean surgical cases excepting Case 4 with a superficial sepsis recovering in two weeks, Case 8, a case of multiple fistulas recovering in three weeks, and Case 22, a case of cancer of the penis showing no recurrence eight

* Read before the Section on Practice of Medicine at the Sixty-Fifth Annual Session of the American Medical Association, Atlantic City, N. J., June, 1914.

1. Arneth, Joseph: Die neutrophilen weissen Blutkörperchen, Jena, 1904.

2. Kagan, S. H.: Nuclear Classification of the Neutrophil Leukocytes and Its Relation to Disease, Boston Med. and Surg. Jour., 1910, clxii 709.

3. Bushnell, G. E., and Treuholtz, C. A.: Arneth's Method in the Clinical Study of Pulmonary Tuberculosis, Med. Rec., New York, 1908, lxxiii, 471.

months later. In contradistinction to the pictures in these cases attention is called to Cases 2, 5, 9, 12, 13 and 20, all of which had decided plus indexes and a slow convalescence.

Series B also consists of forty-two cases from the surgical service of Dr. R. C. Turck. The clean surgical cases only serving as a control were not used after a sufficient number had been obtained for this purpose. This series is, then, largely from selected cases. Table 3, the record of cases in Series B, in addition to giving the Arneth index, records the total white cell and the differential counts. Cases 2, 7, 8, 11, 13, 17, 19, 20, 22, 23, 25, 28, 29, 30, 31, 32, 35, 36 and 37 all show decided shifts to the left. All of them were septic cases excepting Cases 20 and 22, Case 20 being an inguinal hernia in an infant 2 years old, and Case 22 a carcinoma of the stomach, the patient deserting and being lost to observation. In the series, Cases 7, 24, 31 and 35 with plus indexes of 38, 3, 30 and 18.5, and Case 42 with a normal index, succumbed shortly after operation. Cases 1, 6, 18, 27 and 40, in which there was no shift, were of a nature that would lead us to expect one. It is significant, however, that three of these are in children, which, together with the blood-picture in Case 20, an infant, indicates that the Arneth formula, like the general blood-picture, is subject to a wide variation in infants and young adults.

In a further series of twenty-five cases of pulmonary tuberculosis I have been able to confirm the findings of Arnold C. and Henry Klebs,[4] Minor and Ringer[5] and Cummings,[6] in which they found a decided shift to the left in unfavorable cases.

TABLE 2.—RECORD OF CASES IN SERIES A

Case No.*	Age	Diagnosis	Treatment	Disposition	Arneth Count					
					1	2	3	4	5	Shift
1	7	Fracture of femur.	Lane plate; primary union	Cured	4.5	36.5	42.0	14.5	2.5	1.0
2	33	Septic cholecystitis.	Cholecystectomy, followed by infected wound in adipose tissue.	Cured; convalescence 2 months.	11.5	36.0	40.5	11.0	1.0	7.5
3	41	Ventral hernia	Intestinal resection; end-to-end anastomosis; repair of hernia.	Cured	8.0	27.0	50.0	12.0	3.0	...
4	50	Multiple stab wounds, head, face, back and pleura; several infections.	Repaired by suture; drainage	Discharged cured in 3 weeks.	5.5	34.0	44.0	13.5	3.0	...
5	27	Ruptured appendicular abscess; general peritonitis.	Drainage; proctoclysis	Discharged cured in 6 weeks.	10.0	38.5	37.0	13.5	1.0	8.5
6	65	Facial neuralgia	Deep injection of alcohol	Discharged improved in 4 weeks.	14.0	32.0	46.5	5.5	2.0	6.0
7	25	Varicocele	Radical operation	Cured	7.5	28.0	43.5	16.5	4.5	...
8	52	Multiple fistulas	Internal and external urethrotomy; prostatectomy.	Discharged cured in 3 weeks.	7.0	31.5	37.5	21.5	2.5	...
9	45	Rectal fistula; ischiorectal abscess.	Radical treatment on 4 occasions	Discharged cured in 8 weeks.	14.5	34.5	38.0	12.0	1.0	9.0
10	7	Fracture of femur clavicle.	Splints and plaster dressings	Cured	8.0	27.0	46.0	15.0	4.0	...
11	40	Hemorrhoids	Radical operation	Cured	8.5	28.5	46.0	12.5	4.5	...
12	38	Left inguinal hernia; appendicular abscess.	Radical operation for hernia; drainage of abscess.	After draining pus 5 weeks, discharged cured.	20.5	29.0	37.5	11.5	1.5	9.5
13	33	Multiple urethroscrotal fistulas.	Incision, resection, drainage, etc	Discharged cured in 5 weeks.	19.0	34.0	32.5	9.0	5.5	13.0
14	42	Exophthalmic goiter.	Radical operation; primary union	Cured	14.0	37.5	37.0	9.5	2.0	11.5
15	33	Fracture of femur.	Splints and plaster dressings	Cured	9.0	28.0	47.0	12.0	4.0	...
16	35	Appendicitis; Lane's kink.	Appendectomy; adhesions broken	Cured	6.5	34.0	41.0	12.0	6.5	.5
17	43	Fibroid uterus	Hysterectomy	Cured	8.0	28.5	48.0	12.0	3.5	...
18	35	Epithelioma superior and inferior maxillaries.	Curet and cautery	Died 4 weeks later	10.5	37.0	41.0	9.0	2.5	7.5
19	33	Gangrenous appendix.	Radical operation	Cured	15.0	34.0	41.5	7.0	2.5	9.0
20	36	Empyema gallbladder.	Cholecystectomy	Discharged cured in 3 months.	21.0	39.0	34.0	5.0	1.0	20.0
21	20	Compound fracture tibia; multiple superficial injuries.	Lane plate	Cured	19.5	28.5	37.5	10.5	4.0	8.0
22	68	Cancer of penis	Amputation	No recurrence 8 months later.	7.0	28.0	48.5	13.0	3.5	...
23	35	Ventral hernia and fecal fistula.	Intestinal resection, 7 feet 5 inches of intestines.	Improved	6.0	23.5	44.5	19.0	7.0	...
24	2½	Fracture of humerus.	Splints and plaster dressings	Cured	9.5	33.5	48.5	6.0	2.5	3.0
25	24	Compound fracture of tibia.	Bone graft; primary union	Cured	17.5	27.5	45.5	7.0	2.5	5.0
26	12	Hypospadia	Plastic operation	Cured	9.0	30.5	45.5	12.0	3.0	...
27	12	Inguinal hernia; hydrocele cord; scrotal hydrocele.	Radical operation	Cured	16.0	44.5	34.0	5.5	.0	20.5
28	53	Inguinal hernia	Radical operation	Cured	13.5	26.5	50.5	7.5	2.0	...
29	30	Perineorrhaphy and trachelorraphy.	Radical operation	Cured	7.5	29.5	51.5	9.0	2.5	...
30	11	Lacerated hand	Repair of tendons	Cured	6.0	32.5	45.5	12.5	3.5	...
31	34	Fibroid of uterus.	Hysterectomy	Cured	9.5	31.0	46.0	10.5	3.0	.5

* In Case 13 the patient was colored; all the others were white persons.

4. Klebs, Arnold C., and Klebs, Henry: Hematological Studies in Tuberculosis, Am. Jour. Med. Sc., 1906, cxxxii, 538.

5. Minor, C. L., and Ringer, P. H.: Arneth's Method of Blood-Counting—Its Prognostic Value in Pulmonary Tuberculosis, Am. Jour. Med. Sc., 1911, cxli, 638. Ringer, Paul H.: A Further Study of the Prognostic Value of Arneth's Leukocytic Blood-Picture in Pulmonary Tuberculosis, Based Upon 729 Counts in 475 Patients, Am. Jour. Med. Sc., 1912, cxliv, 561.

6. Cummings, R. S.: The Arneth Blood-Count in Pulmonary Tuberculosis, a Report of Eighty Cases, California State Jour. Med., 1913, xi, No. 7, p. 286.

TABLE 3.—RECORD OF CASES IN SERIES B

Case No.*	Age	Diagnosis	Treatment	Disposition	Differential Count								Arneth Count					
					Total White-Cell Count	Polys.	L. Lymph.	S. Lymph.	L. Mono.	Eosin.	Baso.	Trans.	1	2	3	4	5	Shift
1	10	Compound fracture of left femur; closed fracture right femur; laceration on back with infected urinary fistula.	Abduction frame; late operation on left femur.	Complete cure in 7 months.	12,000	78.0	2.0	6.5	3.5	8.0	2.0	.0	7.0	30.5	47.0	12.0	3.5	...
2	10	Osteomyelitis of both tibiae; extensive superficial ulceration; positive Wassermann.	Curettage and antisyphilitic treatment.	Very much improved; nearly healed; still under treatment.	12,500	63.0	7.5	20.0	2.0	5.0	1.5	1.0	9.5	37.0	40.0	10.0	3.5	6.5
3	30	Fracture of fibula	Lane plate	Cured	8,000	68.0	3.0	19.5	2.5	6.0	1.0	..	8.0	30.5	47.0	11.0	3.5	...
4	9	Double talipes; equinovarus	Tenotomy; osteotomies	Cured	9,000	47.5	3.0	40.5	2.5	5.5	.0	1.0	4.5	28.0	55.5	9.0	3.0	...
5	35	Acute appendicitis	Radical operation	Cured	19,000	69.5	18.0	8.5	3.0	1.0	.0	0.0	7.0	29.5	45.5	10.5	7.5	...
6	40	Rectal fistula; ischiorectal abscess	Radical operation	Cured in 4 weeks	8,000	56.0	8.5	30.0	1.5	2.0	.0	2.0	7.0	33.5	46.0	8.5	5.0	...
7	38	General peritonitis	Laparotomy; drainage	Died 12 hours later	18,000	24.5	14.5	28.0	3.0	.0	.0	30.0	30.5	47.5	19.0	2.5	.5	38.0
8	36	Septic cholecystitis	Laparotomy; drainage	Cured in 7 weeks	22,500	79.0	5.0	13.0	2.0	.0	.0	1.0	22.0	46.0	29.0	2.5	.5	28.0
9	39	Endocervicitis; lacerated perineum	Trachelorrhaphy and perineorrhaphy	Cured	7,000	67.5	5.0	26.5	1.0	.0	.0	.0	5.0	34.5	39.5	14.5	6.5	...
10	42	Luetic necrosed tibia	Curettage; specific treatment	Cured	7,500	72.0	3.0	19.5	2.5	2.0	1.0	.0	7.5	36.0	38.5	12.5	5.5	3.5
11	35	Infected ununited compound fracture of tibia.	Resection of necrotic bone	Still under treatment	8,500	77.0	6.0	15.5	1.0	.5	.0	.0	10.5	38.0	39.0	8.5	4.0	8.5
12	33	Chronic appendicitis and prolapse of uterus.	Appendectomy and fixation of uterus.	Cured	9,000	53.5	6.0	26.0	3.5	7.5	2.5	1.0	9.5	29.5	44.0	12.5	4.5	...
13	35	Double salpingitis	Radical operation	Cured	10,000	66.0	6.0	21.5	2.5	2.0	.0	2.0	18.0	36.5	37.5	5.5	2.5	14.5
14	14	Acute appendicitis	Appendectomy	Cured	6,000	55.0	6.5	22.5	4.5	9.5	.0	2.0	12.5	26.0	44.5	11.5	5.5	...
15	37	Endocervicitis	Trachelorrhaphy	Cured	9,500	68.5	5.0	21.0	2.5	1.0	.0	2.0	9.0	33.5	49.0	5.5	3.0	2.5
16	26	Acute appendicitis	Appendectomy	Cured	10,500	49.5	8.5	39.0	.5	1.0	1.0	.5	3.5	28.5	49.0	16.0	3.0	...
17	12	Extensive burns followed by infection	Open air; sunlight; skin graft	Cured	10,000	58.5	5.0	34.5	1.0	1.0	.0	.0	17.0	38.5	40.5	3.0	1.0	15.5
18	30	Extensive burns followed by infection	Placental graft	Improving	8,000	61.0	8.0	24.0	2.0	3.0	.0	2.0	6.0	35.5	48.5	8.0	2.0	1.5
19	60	Urinary fistula secondary to suprapubic prostatectomy.	Resection	Cured	8,500	64.5	7.5	25.5	.5	1.0	1.0	.0	10.5	41.5	43.5	4.0	.5	12.0
20	2	Inguinal hernia	Radical operation	Cured	15,000	26.5	4.5	64.5	3.0	1.0	.0	.5	20.5	36.5	39.5	1.5	2.0	17.0
21	6	Hernia; hydrocele	Radical operation	Cured	10,000	52.5	7.0	30.5	3.0	6.5	.0	.5	5.0	33.0	45.5	12.5	4.0	...
22	30	Carcinoma of stomach		Deserted	8,000	49.0	11.0	35.0	2.0	1.5	.0	1.5	10.5	39.5	45.0	3.5	1.5	10.0
23	45	Empyema	Resection of rib and drainage	Unimproved	10,000	72.0	10.5	14.5	.5	.0	.0	2.5	19.5	43.0	31.0	5.5	1.0	22.5
24	55	Myelitis	Laminectomy	Died	15,000	79.5	7.5	8.5	.5	.0	.0	4.0	7.0	36.0	44.5	8.5	4.0	3.0
25	28	Extensive abscess, neck and jaws, secondary to decayed tooth.	Drainage, 3 weeks	Cured	18,000	85.5	6.5	2.0	3.5	.5	.0	2.0	18.5	43.5	29.5	6.5	2.0	22.0
26	31	Palmar abscess	Drainage, a few days	Cured	8,000	66.5	5.5	22.0	2.0	2.5	.5	1.0	10.0	30.5	46.5	10.0	3.0	.5
27	16	Osteomyelitis of tibia	Curettage	Improved	12,000	57.0	10.5	23.5	2.0	6.0	1.0	.0	9.5	33.5	39.5	14.5	3.0	3.0
28	30	Appendicular abscess; general peritonitis	Drainage, etc	Cured in 4 weeks	18,000	78.5	4.0	12.5	4.0	.5	.0	.5	14.5	37.5	39.0	5.0	4.0	12.0
29	20	Actinomycosis lower and upper maxillary; positive uncinariasis.	Curet and drainage; thymol	Still under treatment	9,000	34.0	8.0	17.5	2.0	31.5	2.0	5.0	21.0	46.5	26.5	4.0	2.0	27.5
30	28	Empyema	Resection of rib; drainage	Still under treatment	25,000	83.0	1.5	13.5	1.0	.0	1.0	.0	15.5	54.5	24.5	4.5	1.0	30.0
31	13	Ruptured appendicular abscess; general peritonitis.	Drainage, etc	Died	15,000	83.0	6.0	6.5	2.5	2.0	.0	.0	20.5	49.5	25.0	4.0	1.0	30.0
32	25	Cellulitis of arm, shoulder and hand resulting from infected finger.	Drainage	Cured	10,500	77.0	2.0	19.5	1.0	.0	.5	.0	20.5	48.5	27.5	3.0	.5	29.0
33	17	Spastic paralysis with deformity	Tenotomies and resection of knee-joint.	Improved	11,00	57.0	3.0	27.5	.5	7.0	2.5	2.5	3.0	37.0	46.5	10.5	3.0	...
34	33	Multiple varicose ulcers of leg	Resection of saphenous; curettage of ulcers, etc.	Cured	9,000	48.0	5.5	40.0	2.5	3.0	1.0	.0	5.5	40.5	46.0	5.5	2.5	6.0
35	36	Empyema of gall-bladder; perforation; general peritonitis.	Laparotomy; drainage	Died	9,250	69.0	9.5	12.5	1.0	1.5	.0	6.5	16.5	42.0	32.5	6.5	2.5	18.5
36	68	Septic cystitis	Suprapubic prostatectomy	Cured	12,600	83.0	4.5	5.5	.0	3.0	1.0	3.0	15.5	40.5	39.5	2.5	2.0	16.0
37	31	Acute appendicitis	Radical operation	Cured	7,000	70.0	4.0	20.0	3.5	.5	2.0	.0	13.5	32.5	45.5	4.0	4.5	6.0
38	24	Acute appendicitis	Radical operation	Cured	9,000	78.0	7.5	10.5	2.0	2.0	.0	.0	4.0	35.0	51.5	7.5	2.0	...
39	28	Acute appendicitis	Radical operation	Cured	7,800	72.0	8.5	15.5	2.0	1.5	.5	.0	5.5	30.5	56.0	6.0	2.0	...
40	10	Pott's disease	Spinal jacket	Under treatment; improving	9,000	76.5	4.0	15.5	1.0	2.0	1.0	.0	8.0	32.0	51.5	4.5	4.0	...
41	42	Chronic cholecystitis of 10 years' standing.	Cholecystectomy	Died from acute pancreatitis 48 hours after operation.	6,000	63.5	3.0	25.5	2.0	4.0	.0	2.0	6.0	33.0	51.5	6.5	3.0	...
42	28	Chronic appendicitis	Appendectomy	Cured	7,200	69.5	4.0	22.5	1.5	2.5	.0	.0	5.5	34.0	52.5	4.5	3.5	...

* In Cases 3 and 22 the patients were colored; all the others were white persons.

In a smaller series of typhoid fever cases I also found a shift to the left in severe infections, while in malaria fever and pellagra there seems to be no change from the normal Arneth picture. I hope to have the opportunity to report in detail on this work at some future time. My findings up to the present would lead me to think that in certain classes of cases the Arneth index is of some prognostic value, enough so at least to warrant a careful and intensive study of the blood-picture in all septic and infectious diseases.

I wish to acknowledge my deep appreciation to Dr. Raymond C. Turck, chief surgeon of St. Luke's Hospital, for the privilege of studying the blood of his patients, and for many other courtesies extended to me while the work was in progress.

THE DESICCATION TREATMENT OF CONGENITAL AND NEW GROWTHS OF THE SKIN AND MUCOUS MEMBRANES *

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I have undertaken during the past six years some experimental and clinical studies with high-tension electric currents, for the purpose of determining their value relative to the reduction of accessible adventitious growths. The practicability of utilizing such currents for producing a thermic action of just sufficient intensity to devitalize tissue by dehydration was described by me before another section[1] of this association in 1912. This method has been developed to a higher degree of efficiency since that time, and additional facts concerning it realized. It has proved so satisfactory in my hands that I take the liberty of again calling attention to it and of presenting a series of pictures to show some of the results obtained.

The field of application is limited to accessible neoplasms, as of cutaneous surfaces and such mucous membranes as the mouth, throat, larynx, conjunctiva, bladder, urethra, vagina, uterine cervix and rectum.

The advantages of desiccation are as follows: 1. Accessible abnormal tissue may be destroyed rapidly and effectively and the operation is bloodless. 2. It is a method of precision. A small point may be destroyed without infringement on normal tissues, as may an area of large size and considerable depth. 3. No needle or other instrument is inserted into the growth. 4. The current has an anesthetizing property, which renders application bearable. 5. There is a devitalizing action on cells of less vitality than normal cells somewhat deeper than the desiccated area, leaving the normal cells intact. 6. There are sterilization and rapid repair. 7. Blood- and lymph-channels are sealed, which lessens the likelihood of metastasis in cases of malignancy. 8. The cosmetic result is good, as shown by the absence of contracted cicatricial tissue.

There are no disadvantages, other than the expense and cumbersomeness of necessary apparatus.

THE DESICCATION METHOD

Heat effects as applied to living tissue range in degree from simple hyperemia to carbonization. Somewhere between these extremes there is a point the effect of which is more than hyperemia and less than carbonization, which is called the desiccation point. If this accurate caloric degree is produced, controlled and sustained, it will cause rapid dehydration of the tissue desired to be devitalized, rupturing the cell capsule and transforming it into a dry mass; in other words, just enough heat is generated to destroy tissue without actually carbonizing it. Substances such as soap, potato and tissues, cadaveric and living, may be desiccated through a sheet of white paper without charring or discoloring the paper, and the transformed matter pulverized between the fingers. The correctness of the desiccation principle has been acknowledged by physicists, and I claim for it a new principle for application to surgery.

Instrumentation. — Static apparatus, twenty-four plates, twelve made of fiber 33 inches in diameter, and an output of, at least, 3 milliamperes of current, and twelve of glass 38 inches in diameter. Five horsepower motor to propel fiber plates, these plates being capable of approximately 2,000 revolutions a minute. Two Leyden jars, each of 0.00042 microfarads' capacity, used in conjunction with a resonator or surge-coil, the inductance portion of which has forty turns 3½ inches in diameter, of 25 gage Brown and Sharp copper wire. The surge end of the coil has ninety turns of the same size wire, same diameter of turns. These careful measurements are necessary for a proper balance between the capacity, inductance and the resistance.

Technic.—A Leyden jar is connected with each pole of the machine. The resonator or surge-coil is interposed between them and connected with each jar, thus completing the circuit. One end of the resonator is grounded. A wire is carried from the side of the resonator not grounded to the desiccation applicator. This applicator is supplied with a make-and-break device by means of which the current is controlled at will. A fine needle is inserted in the end of the applicator and kept in place by means of a thumb-screw. The speed of the plates, which controls the current strength, is regulated according to the size and depth of the area desired to be destroyed. This is not done by set rule, but by knowledge gained from technical experience. The rods of the static machine are then separated until the discharge of sparks assumes a characteristic formation, which is known as the point of critical resistance. The patient should lie on a low operating-table or reclining-chair. The operator sits and rests his elbow against the side of the table with his wrist on the part of the patient adjacent to the area to be treated, to insure a steady hand. For superficial dehydration, the needle-point is not brought in direct contact with the tissue, but an air-space varying from 0.25 cm. or less to 2 cm. is interposed between them. The electron waves are thrown from a metal point and projected to the tissue in the form of a fan-shaped

* Read before the Section on Dermatology at the Sixty-Fifth Annual Session of the American Medical Association, Atlantic City, N. J., June, 1914.

1. Clark, W. L.: High-Frequency Desiccation, Fulguration and Thermoradiotherapy, Their Uses in Therapeutics, THE JOURNAL A. M. A., Sept. 21, 1912, p. 916.

Other contributions to the subject by the author are as follows:

The Destruction of Surface and Cavity Neoplasms by Desiccation, a New Electrical Effect; Preliminary Report, New York Med. Jour., June 10, 1911.

High-Frequency Desiccation, Its Uses and Limitations in Surgery and Dermatology; a Second Report, Month. Cycl. Prac. Med., August, 1912.

Electrical Desiccation as an Adjunct to Surgery, with Special Reference to the Treatment of Cancer, Surg., Gynec. and Obst., August, 1912.

The Uses of Electric Desiccation, Fulguration and Thermoradiotherapy in Surgery, Supplementary Volume, Keen's System of Surgery.

efflux of sparks following one another with such rapidity that to the eye the appearance is that of a luminous glow. When deep destruction is desired, the patient is grounded and the needle is brought in direct contact with the tissue. The placing of the operator's hand on the patient at a point opposite the area under treatment adds to the capacity, and helps to concentrate the current; this is usually sufficient without grounding. It matters not which pole is used, as this current is unlike the galvanic current, which has electrolytic or chemical properties, and polarity must be considered, whereas the desiccation current from either pole is purely thermic in action. The unaltered current from the static machine cannot be used for desiccation, but it must undergo a physical transformation analogous to the metamorphosis of a volume of water into spray or steam. This is done by introducing into the circuit the Leyden jars and resonator as described.

DIFFERENTIATION BETWEEN DESICCATION AND OTHER ELECTROSURGICAL METHODS

1. Desiccation (Clark).
2. Electrolysis; synonyms, ionic surgery, cataphoresis (Massey).
3. Fulguration (DeKeating Hart), non-destructive.
4. Diathermy (Nagelschmidt), synonyms, thermopenetration, thermocoagulation.
5. Fulguration (destructive); synonym, high-frequency cauterization.

1. Desiccation (Clark) devitalizes by dehydrating the tissues.

2. Electrolysis destroys tissue by the chemical or electrolytic action of the galvanic current.

3. Fulguration (DeKeating Hart) does not directly destroy tissue, but it is asserted that when long high-tension sparks are applied to the field in malignant disease after radical operation, alteration of nutrition of the part ensues, preventing the proliferation of cancer-cells. It is also declared that the percentage of recurrences is less than with operation alone.

4. Diathermy (Nagelschmidt) is produced by the bipolar d'Arsonval current. It may be used for simple heating of the tissue or it may be carried to the point of destruction, in which case the tissues are cooked. No sparks are used by this method, but two electrodes are brought into direct contact with the tissue, the position of the indifferent electrode depending on the direction in which the heating or destruction is desired. The current flows in both directions, and meeting with resistance in the body in completing the circuit, heat is generated in the tissues between the electrodes.

5. Fulguration (destructive). In this country the term "fulguration" has been employed to express any sparks of high frequency that have the property of destroying tissue, whereas the original fulguration as described by Hart is non-destructive. On account of the general acceptance of the term "fulguration," the prefix "destructive" will be used to differentiate it from the Hart method, which is non-destructive. High-frequency cauterization, however, is more descriptive, and would be a better term to use. Destructive fulguration is more closely allied with desiccation than the other methods, because they are both destructive effects produced by sparks of high frequency, but are quite distinct in character, as will be shown. Destructive fulguration is produced from an induction coil and desiccation from a high potential static apparatus.

DIFFERENTIATION BETWEEN THE PHYSICS OF DESTRUCTIVE FULGURATION AND DESICCATION

While the current generated from a coil or other magnetic device, and transformed by proper accessories, is capable of producing a coarse destructive action, the current from such a source has insufficient frequencies or oscillations, and is incapable of producing the refined desiccation effect, on account of the interruptions in the primary of the coil. As no discharge can be transmitted to the body until such interruption occurs, the current is delivered in a series of hot discharges, which renders the thermic degree inconstant, and the impact against the tissue painfully severe. A steady flow of current as is produced from the static machine is necessary, but it must be of large capacity and subject to control, or it will fall short of or go beyond the desiccation point. The destructive effect on tissue produced by the coil type of current may be compared to a surgical operation with a saw-edged knife, while the devitalizing effect produced with the static type of current may be likened to the more refined action of a keen-edged bistoury.

EFFECTS OF DESICCATION

The size and depth of the area that may be desiccated with one application is controlled by the operator and depends on the following six factors: (1) current strength; (2) whether monopolar or bipolar; (3) frequency of oscillations; (4) distance of the electrode from the body; (5) time of exposure, and (6) density of tissue.

Desiccation is usually, but not always, contra-indicated in neoplasms that are covered by healthy skin, as the skin must also be destroyed to reach the diseased tissue. Desiccation destroys tissue without opening blood- or lymph-channels, and will act as a styptic when there is oozing of blood. It sterilizes tissues on which it acts directly, as has been shown by experimentation with cultures taken before and after treatment of an infected area of tissue. A dry crust forms at once after the application, and the time required for separation depends on the character of the tissue. In the case of mucous membranes the desiccated tissue soon becomes macerated by the secretions and may separate in a few hours, while on the skin surface it takes a longer time. When the skin is soft and vascular there is more rapid separation than when it is hard and with poor blood-supply. Thus, a soft mole will slough more readily than a callus. Regeneration of skin or scar tissue often takes place underneath the crust. The procedure is not entirely painless, but quite bearable if the technic is correct. The current, if applied gently at first, has anesthetizing properties, and is usually sufficient, but in supersensitive persons a local anesthetic is employed in addition, either by topical application in the case of mucous membranes and ulcerated surfaces, or by infiltration if the area is extensive and deep, although the latter is never practiced when there is a suspicion of malignancy; cocain driven into the tissue by positive galvanism is used in preference. In rare cases a general anesthetic is required. Nitrous oxid gas and oxygen is used in preference, although chloroform may sometimes be employed. Ether should never be considered on account of its inflammable properties.

CONDITIONS FOR WHICH DESICCATION IS APPLICABLE

Verruca, Moles, Roentgen-Ray and Senile Keratoses.—Usually one application is sufficient in these conditions. The lesion is immediately transformed into a dry crust. It was my practice formerly to allow this crust to remain until it separated naturally, but it has recently been found that it is an advantage for immediate cosmetic reasons and more rapid healing to remove the crust at once with a groove director, or some such instrument. The base of the lesion is then sealed by superficial desiccation, and the thin ensuing crust separates in a few days. Healing is rapid, and the area, which is at first slightly red, gradually fades to normal color. There is no contracture as is usually the case with cauterization, but a smooth surface results. It is justifiable to advise the removal of these growths for other than cosmetic reasons, as they may be considered precancerous lesions.

Nevus Pigmentosus and Vascularis, Lentigo, Chloasma, Tattoo Marks, Coal Marks, Etc.—In these conditions the technic is the same as in the preceding, and the results have been quite satisfactory. In large port-wine marks and pigmented nevi I have found the ultraviolet ray produced by the Kromayer quartz-mercury lamp more satisfactory.

Keloid.—Desiccation followed by the Roentgen rays has been found to be a successful treatment. The same results may be obtained by the Roentgen rays alone, but a longer time is required. It has been observed that a better cosmetic result is obtained by desiccation followed by the Roentgen rays than by excision and the Roentgen rays.

Neoplasms of the Hollow Viscera.—Bladder: Employing a catheterizing cystoscope under the usual aseptic conditions, the urethra is anesthetized by a 2 per cent. cocain solution, or some other local anesthetic, and the bladder distended with sterile water or boric acid solution. A wire insulated to the end is then passed through the instrument and brought in direct contact with the growth, which may be destroyed in one, or a series of applications, depending on its size. The current and destructive action is always under the control of the operator. Recent experience justifies the hope that in selected cases desiccation may be of service in prostatic hypertrophy, treated by the urethral route.

Urethra: Papilloma, Caruncle, Granulations, Infected Glands, etc.: A thin insulated wire is passed through the treatment aperture of an air-inflation or other urethroscope, as is done with the applicator in making topical applications. Papilloma, caruncle, chronic granulations and infected glands following Neisserian infection, or other causes, may be destroyed, and there is sterilization somewhat deeper than the area destroyed because of heat penetration. The advantages of this treatment over the cautery and chemical escharotics are absence of much inflammatory reaction and no contracted cicatrix, and hence less likelihood of stricture.

Rectum: Hemorrhoids, Papilloma, Granulations, Ulcerations, etc.; External hemorrhoids and growths near the rectum may be very satisfactorily treated by desiccation, and growths in the rectum when a suitable proctoscope is used to render the lesion accessible. Operation is usually to be recommended in extreme internal hemorrhoids in preference to desiccation, but should there be a contra-indication to operation, even these may be successfully treated by desiccation.

Larynx: Tumors of the larynx may be destroyed by desiccation. The laryngoscope or the ordinary laryngeal mirror may be employed to expose the interior of the larynx, and the current applied by means of an insulated wire suitably curved. It is essential to success in these cases to destroy all reflexes in the throat with a strong solution of cocain; otherwise the application of the current will be impossible.

There is reason to hope that with improved endoscopes the future may show desiccation to be applicable to some neoplasms in the esophagus and stomach.

Throat and Pharynx: Neoplasms in these regions are quite accessible, and may be destroyed by desiccation. Mucous membrane growths respond readily. The whole or a portion of diseased tonsils may be desiccated without causing bleeding, and the operation is made bearable by applying a solution of cocain of sufficient strength. Desiccation has no particular advantage over excision in tonsil work, but should there be a refusal or contra-indication to operation, then desiccation may be relied on as a worthy substitute. In young children operative measures are to be recommended in preference to desiccation in throat conditions, because a general anesthetic must be used. Chloroform in the presence of unusual heat gives off hydrochloric acid and chlorin fumes, and ether is contra-indicated on account of its inflammability.

Nose.—Growths in the anterior nares, such as polyps, angiomas, papillomas and epitheliomas are accessible, and are usually successfully treated by desiccation.

Eye.—Desiccation may be applied externally to the lids for such lesions as xanthoma, verruca, nevi and epithelioma, and to the conjunctiva for trachoma, dry granular conjunctivitis, papilloma, ulcerations and pterygium. There is little danger in working near the eye, as the control of the desiccation current is perfect.

APPLICATION OF DESICCATION IN MALIGNANT DISEASE

1. *Cutaneous Surfaces.*—(*a*) Localized: Desiccation in my hands has been almost uniformly successful in localized epitheliomas and rodent ulcers of the skin. The destruction is carried beyond the diseased area for a short distance to insure thorough eradication. Blood- and lymph-channels are sealed, on account of which there is less likelihood of metastasis. Healing is rapid, and the cosmetic effect excellent. When a large area is involved a short course of Roentgen-ray treatments following desiccation is advisable, taking advantage of their well-known selective action on cancer-cells, lest there be some disease that possibly escaped desiccation. This may not always be necessary, but it is wise to take advantage of this combination treatment. As much can be immediately accomplished by one desiccation application as can be accomplished by the Roentgen rays alone in a comparatively long period of time, and desiccation will cure cases that the Roentgen rays alone will not affect, but in combination the efficiency of both is increased.

(*b*) With Metastasis: The results in these cases are usually unsatisfactory by any method, and no claims are made for desiccation except in conjunction with radical operative measures, when the field may be desiccated after operation in suitable cases, to seal blood- and lymph-channels. It is a duty as a routine measure to treat postoperatively with the Roentgen

rays as the best means of preventing recurrence, promoting comfort to the patient and prolonging life.

2. *Mucous Membranes.*—(*a*) Localized: In localized cancer of the mucous membranes, such as the tongue, and the buccal surfaces or the lip, the results of desiccation compare favorably with those obtained in localized skin cancers, although there is not quite the same assurance of success, on account of greater proneness to metastasis and because one cannot be sure that the adjacent glands are not involved, even though they may not be palpable.

(*b*) With Metastasis: This is the most hopeless class of cases with which the surgeon has to deal, and there is much to be desired with any treatment known at the present time. Desiccation is used only as a palliative. Unless too far advanced, the chance of possible success afforded by radical operation or desiccation followed by the Roentgen ray should not be denied the patient.

3. *Inoperable Cancer.*—In absolutely inoperable cases, whether of the skin or mucous membranes, the initial lesion may be desiccated and massive Roentgen-ray dosage applied to the glands and desiccated site. Some unexpected good results have shown that this course is sometimes justified. In cancer of the cervix and rectum, if inoperable, desiccation as a palliative means has advantages over the curet and cautery, for the reasons that a general anesthetic is unnecessary, there is less inflammatory reaction, it destroys the accessible diseased tissue quite as effectively, sterilizes, deodorizes and will stop bleeding.

4. *Postoperative Recurrences.*—Desiccation has a field of usefulness in postoperative recurrences in any location that is accessible. For example, recurrence along the line of excision in cancer of the breast may sometimes be controlled by this method, or at least act as an excellent palliative.

5. *Sarcoma.*—In accessible sarcomas, if seen early, desiccation is a satisfactory treatment. One extensive melanotic sarcoma of the forearm, confirmed by pathologic examination, which was excised, recurred in a short time and was desiccated. There has been no recurrence at the points treated for two years, but several new foci appeared at various times, which were all controlled by desiccation. In advanced sarcoma the same general rules apply as in advanced carcinoma.

Miscellaneous conditions in which desiccation has been used with success are: early Paget's disease, lupus vulgaris and erythematosus, acne vulgaris, hypertrophic acne rosacea, adenoma sebaceum, chancroids, condylomas, clavus, varicose and other ulcers with exuberant granulations, growths and granulations on the tympanum.

SUMMARY OF INDICATIONS

1. Desiccation is a successful treatment for all accessible benign neoplasms or lesions of the skin and mucous membranes in which destruction of tissues and good cosmetic result is desired. All of such lesions may be regarded as possibly precancerous.

2. Desiccation is curative in the great majority of localized malignant lesions of the skin and mucous membranes. In the more advanced cases the efficiency is increased by combining it with the Roentgen rays, attention being paid to accurately measured dosage.

3. Desiccation is only palliative in cancerous lesions associated with glandular metastasis, in postoperative recurrences and in cases too far advanced for operation. The use of desiccation and the Roentgen rays in some of these cases is justifiable, because sometimes good results beyond expectations are obtained.

I have endeavored to present the important features of this method, covering the various fields of application as briefly as possible, and it is hoped that the presentation is sufficiently comprehensive to serve as a basis for others who may desire to take up the work.

1809 Chestnut Street.

ABSTRACT OF DISCUSSION

Dr. Jay F. Schamberg, Philadelphia: Desiccation is a valuable method in appropriate cases of various cutaneous growths. Many of these conditions, as we know, are quite amenable to other methods of treatment long employed by dermatologists. For example, angiomas, in most cases, can be satisfactorily removed by carbon dioxid snow. I believe the method described by Dr. Clark, however, is very valuable in cancer of the mucous membranes of the nose and mouth, particularly the latter, which often proves unsatisfactory to other methods, including surgical procedures. From what I have seen in Philadelphia of the results of the desiccation and fulguration method, I believe it is perhaps the best one I know of in the treatment of cancer of the mouth, and is preferable in many cases to excision. It has a very excellent field of usefulness in the treatment of cutaneous growths, although there are many other physical agents that are equal and some, perhaps, superior to it for the removal of superficial lesions. In a few of the cases I have seen, fulguration has produced an unnecessarily extensive destruction of tissue, more so than would follow other well-chosen methods. These cases, however, had not been treated by Dr. Clark. It might be well for others to emulate Dr. Clark and perfect the technic of this method of treatment, which appears to have a distinct field of usefulness.

Dr. H. H. Hazen, Washington, D. C.: One disadvantage is that in these cases it is impossible to obtain a specimen for pathologic study, so that the true character of the lesion can be determined. We know that with the prickle-cell type of epithelioma, metastases are very apt to occur, while with the basal-cell type they are very rare, and we need statistics on the ultimate results in these cases, based on pathologic examination.

Dr. C. A. Simpson, Washington, D. C.: How does Dr. Clark get his selective action by this fulguration method? Does he compare it with the selective action of the Roentgen ray or radium?

Dr. W. H. Schmidt, Atlantic City: I have had some experience with this method, and have recently employed it in two cases of cancer of the throat. In the first case, in which the disease was well advanced, the pain was relieved after two or three applications of the desiccation method. In the second case, which is still under treatment, the outlook is favorable. The disease is not so far advanced as in the first case, and not only has the pain been relieved, but also the ulcerated surface has a much healthier appearance, and the discharge has lessened. I have also found the method of value in infected and painful ulcers of the leg.

Dr. Arthur F. Holding, New York: Radium is expensive and difficult to obtain, and so far as I have been able to ascertain, the method of treatment described by Dr. Clark is applicable to the same class of cases as is radium, and inasmuch as many practitioners cannot obtain radium, while this apparatus and method of treatment, on the other hand, is within their reach, it is a very valuable addition to our armamentarium. Of course, radium may possess certain properties or advantages of which we are now ignorant, but so far as we know at present, its usefulness in skin diseases is now limited to a class of cases approximately similar to those reported by Dr. Clark. The apparatus necessary to apply desiccation is much more readily obtainable than radium, and up to the present it seems to have produced equally good results in the treatment of various skin growths, and in less time.

DR. WILLIAM L. CLARK, Philadelphia: Dr. Schamberg referred to the unnecessary destruction of tissue by the fulguration method in some of the cases that came to his notice. I wish to again emphasize the fact that fulguration and desiccation are separate and distinct methods. With desiccation, in experienced hands, there is no unnecessary destruction of tissue in any case, as the operator has complete control, even to the smallest discernible point. The reason sections for pathologic study were not taken in many cases is due to the fact that such a procedure, to a certain extent, would defeat the object of desiccation, which is to destroy tissue without opening blood- and lymph-channels. In apparently clear cases this risk is not taken; in doubtful cases sections have been taken and the channels immediately sealed by desiccation. Desiccation will destroy normal tissue quite as readily as malignant tissue if brought in direct contact, but the point made, an explanation of which was asked for, is that malignant tissue appeared to have been destroyed and had disappeared at points deeper than those actually primarily destroyed by desiccation. This is probably explained by the fact that abnormal tissue is of lower vitality than normal tissue, and that the heat penetration was sufficient to cause the death of the diseased cells, with recovery of the normal cells. In this way it does compare with the selective action of the Roentgen ray and radium. The desiccation method of treatment is applicable to other conditions besides skin lesions. It has been successfully used for neoplasms of such accessible mucous cavities as the larynx, bladder, vagina, rectum and urethra.

THE DIET IN TYPHOID FEVER*

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Whether fever patients shall be fed liberally or sparingly is an old question. Most of us were brought up on the adage, "Stuff a cold and starve a fever," though long before our time Graves[1] had advocated a liberal diet and had suggested that should his friends after his death seek a suitable epitaph for his grave they might use the words, "He fed fevers." In typhoid fever especially it was almost a universal practice to limit the diet to fluids and to a low caloric intake. Emaciation was believed to be inevitable in typhoid fever. Losses of weight as great as 30 or 41 per cent. (Curschmann[2]) have been recorded in extreme instances. Complications increased the loss of weight (Lorain[3]), but even on a diet of 2,600 calories per day in an ordinary case the weight may decrease by as much as 20 pounds (Purits[4]). The disinclination of the patient to take food was considered an indication that he did not need food. Further, it was supposed that food substances could not be well digested and assimilated in the course of high fever; and it was believed that the risks of hemorrhage and perforation were enormously increased in typhoid if solid foods were given. Finally, aside from the difficulties and dangers mentioned above, it was thought that in fever there is either (1) toxic destruction of protein which makes the maintenance of nitrogen equilibrium impossible even if the protein intake and the total caloric intake be as high or higher than is necessary to maintain weight and nitrogenous equilibrium in health (F. Müller,[5] Kraus), or (2) there is a simple hyperactivity of metabolic functions in typhoid which renders weight maintenance difficult (Benedict and Surányi;[6] Ewing and Wolf;[7] Grafe[8]).

Following Graves, a few clinical men attempted to nourish their typhoid fever patients better than before, but up to a few years ago, despite the advice of shrewd clinicians like F. C. Shattuck[9] of Boston and A. G. Barrs[10] of England, not many practitioners have dared to fly in the face of custom and resort to a high caloric intake. Recently, and largely through the influence of the enthusiastic studies carried on at the Bellevue Hospital, New York, by Dr. Warren Coleman[11] and his associates, clinicians have become more courageous, especially in hospital practice. A more liberal diet is now becoming general, though but few, perhaps, resort as yet to the high caloric values reached and advised by the more ardent advocates of liberal feeding.

METABOLISM IN TYPHOID

Laboratory workers have done and are doing their part to establish a rational basis for the feeding of fever patients. As early as 1882 von Hoesslin[12] had shown that foods were absorbed almost as well in typhoid fever as in health. A little later, a long series of publications appeared in St. Petersburg reporting the results of work in Chudnowsky's clinic. These Russian observers, according to Dubois,[13] who gives a brief summary of their work, found that foodstuffs were very well absorbed in fevers, though the absorption was affected to a certain extent by the patient's general condition. Similar results were obtained by von Leyden and Klemperer.[14] These earlier observers found that emaciation could be, to a large extent, prevented by liberal feeding in typhoid, though despite the administration of large quantities of protein they were unable to maintain nitrogen equilibrium in the disease.

In 1909 appeared the important article by Shaffer and Coleman[15] on the protein metabolism in typhoid fever. Their investigations were undertaken with the idea that the destruction of body protein in fever might be reduced to normal limits by adding large quantities of carbohydrate to the food, to act as protein-sparers. Their research is a remarkable one and will doubtless be looked back to in future as an unusual example of a metabolic study of high order at a time when but relatively few such studies were being undertaken in this country. They concluded from their work that by the use of diets of high caloric value, especially rich in carbohydrates, it is possible to prevent not only the "febrile loss" of body protein-nitrogen in patients suffering from typhoid fever, but also

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* Read before the Section on Pharmacology and Therapeutics at the Sixty-Fifth Annual Session of the American Medical Association, Atlantic City, N. J., June, 1914.

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2. Curschmann, H.: Typhoid Fever, American edition, 1905, p. 368.
3. Lorain, P. J.: De la température du corps humain et de ses variations dans les diverses maladies, Paris, 1877.
4. Purits, K. N.: On Increased Feeding of Typhoid Patients, Arch. f. path. Anat., 1893, cxxxi, 327.
5. Müller, F.: Leyden's Handbuch der Ernährungstherapie, Ed. 2, i, 213.
6. Benedict, H., and Surányi, N.: Die Stoffwechselvorgänge während der Typhusconvalescenz, Ztschr. f. klin. Med., 1903, xlviii, 290; xlix, 482.
7. Ewing, J., and Wolf, C. G. L.: The Clinical Significance of the Urinary Nitrogen, iii, Nitrogenous Metabolism in Typhoid Fever, Arch. Int. Med., October, 1909, p. 330.
8. Grafe, E.: Zur Frage des Stoff- und Kraftwechsels im Fieber, Deutsch. Arch. f. klin. Med., 1911, cii, 213.
9. Shattuck, F. C.: Diet in Typhoid Fever, THE JOURNAL A. M. A., July 10, 1897, p. 51.
10. Barrs, A. G.: A Plea for a Less Restricted Diet in Typhoid Fever, Brit. Med. Jour., 1897, i, 125.
11. Coleman, Warren: The High-Calory Diet in Typhoid Fever: A Study of 111 Cases, Am. Jour. Med. Sc., 1911, new series, cxliii, 77; Five years' Experience with the High-Calory Diet in Typhoid Fever, THE JOURNAL A. M. A., Aug. 3, 1912, p. 363.
12. Von Hoesslin, H.: Arch. f. path. Anat., 1882, lxxxix, 95, 303.
13. Dubois, E. F.: The Absorption of Food in Typhoid Fever, Arch. Int. Med., September, 1912, p. 177.
14. Von Leyden, E., and Klemperer, G., in Handbuch der Ernährungstherapie (von Leyden), 1904, ii, 332.
15. Shaffer, P. A., and Coleman, W.: Protein Metabolism in Typhoid Fever, Arch. Int. Med., December, 1909, p. 537.

that due to the so-called toxic destruction of body protein. They are inclined to believe that there is a greater need for carbohydrate in fever than in health and that if the carbohydrate of the food intake be insufficient the body-protein will be drawn on to supply energy in an available form; if, on the contrary, enough carbohydrate be fed, the body protein will be protected. An interesting feature of the work of Shaffer and Coleman is the finding that from 10 to 15 gm. of nitrogen in the food ingested is sufficient to maintain nitrogen equilibrium, provided large amounts of carbohydrate be simultaneously eaten. They found that their patients could be induced to take as much as from 1,000 to 3,000 calories in the worst stages of the disease, while in convalescence an intake of from 5,000 to 8,000 calories could sometimes be reached. Later, E. F. Du Bois, working in Lusk's laboratory, studied especially the absorption of food in typhoid fever and, confirming von Hoesslin, found that typhoid patients can, throughout the disease, absorb carbohydrates and protein as well as normal persons. He asserted, too, that they can absorb very large amounts of fat, but that the percentage of absorption is somewhat lower than the normal, especially in the earlier part of the disease. During the present year, R. A. Kocher,[16] working in Friedrich von Müller's clinic in Munich, has published a paper on the metabolism in fever and compared the results with those obtained on himself and on his companion (Ferguson) when engaged in active exercise. This investigator used the nitrogen minimum (Sivén), to which excretion in the urine can be reduced, as the basis of his studies. With a very low protein intake and a high carbohydrate intake, the amount of nitrogen excreted in the urine can be reduced to as little as one-third of the amount given out on total fasting. The nitrogen minimum is a high value in fever even with a caloric intake of 80 calories per kilogram. This increase in "nitrogen minimum" is due neither to increased expenditure of energy nor as Graham and Poulton have shown to the fever alone, nor to insufficient caloric intake. Kocher points out that an analysis of Shaffer and Coleman's experiments indicates that while nitrogen loss can be compensated for by a high caloric intake, there are periods in the disease when nitrogen equilibrium cannot be maintained. Kocher's findings, therefore, support the view previously expressed by von Müller that there is in fever an actual destruction of protein due to certain special influences on the protoplasm and that it is difficult or impossible to maintain protein equilibrium at certain periods of febrile disease, even on a high caloric diet.

THE HIGH CALORIC DIET

This has been described so often that its details need not be repeated here. For those who wish quickly to inform themselves regarding its content and mode of application I would recommend the perusal of the chapter dealing with it in Friedenwald and Ruhräh's textbook,[17] or, especially, of the original article by W. Coleman and of that of Crohn.[18]

Where good milk is not available, or in the cases in which milk is not well borne, a diet such as that recommended by G. C. Rodgers,[19] of Elkins, W. Va., may be tried. In parts of the South (Florida, Georgia, etc.), physicians have told me that they have difficulty in securing good milk and that they often have to be content with foods other than milk in the treatment of typhoid fever.

The amount of food necessary to meet the needs in typhoid fever is undoubtedly large. Though Grafe asserts that the total metabolism in a fasting typhoid patient never exceeds 2,798 calories, Coleman's studies prove that to obtain nitrogen equilibrium, from 4,000 to 5,500 calories per day are necessary, that is, from 60 to 80 calories per kilogram of body-weight. The optimal protein intake seems to lie between 62 and 94 gm. in the twenty-four hours, which corresponds to 10 or 15 gm. of nitrogen per day. The carbohydrate intake is most important; when not contra-indicated for some special reason, it should make up, Coleman thinks, a half of the calories given. Fat seems to be better borne in the amphibolous period and during convalescence than in the earlier stages of the disease.

Protein may be taken in sufficient amounts as eggs and milk. Schottmüller[20] and other German writers give as much as 100 gm. of scraped meat per day, but in American clinics meat is rarely given, as it seems often to excite digestive disturbances and to increase renal irritation. Meat soups are also avoided, though a little broth or consommé may be given to improve the appetite and to stimulate the secretion of the gastric juice. If soup be given, it is well to add eggs and cereal to it to increase the caloric value. Eggs may be taken raw, or beaten up with milk, or as soft-boiled or coddled eggs. From four to eight eggs may often be given in the twenty-four hours.

The carbohydrate may be given partly as milk, partly as bread or toast (with butter), and partly as lactose added to the milk, cereals and orange-albumin. Coarse cereals with cellulose residue are to be avoided. Dry toast or zwiebach buttered, if thoroughly chewed by the patient, may be used without harm. Boiled rice and mashed potatoes may be given as variety. Lactose is a very important article of the diet. It is easily soluble, is not very sweet, and can be given in large amounts without the appearance of sugar in the urine.

A liberal amount of fat in the diet will send the calories up, but not all patients bear fat well, especially early in the disease. Fat may be tried in the form of cream, of butter and of yolk of egg. Coleman has been able to give as much as 200 or 250 gm. of fat per day without causing digestive disturbances. The fat content of ordinary milk is of course considerable, and milk in amounts of from 1.5 to 2 liters per day can be given to most patients without difficulty. Some patients, however, are intolerant of milk even when modified by peptonization, or by mixing with lime-water or with sodium citrate. Some patients take fermented milks very well, but the objection to them lies in the reduction of the carbohydrate content by the fermentation.

Fruit juices, to which lactose has been added, may be given, as long as there is no diarrhea, but they should be discontinued should diarrhea develop. It must be remembered, however, that patients on the high-calory diet ordinarily have from two to four stools a day.

16. Kocher, R. A.: Ueber die Grösse des Eiweisszerfalls bei Fieber und bei Arbeitsleistung, Deutsch. Arch. f. klin. Med., 1914, cxv, 82.
17. Friedenwald, J., and Ruhräh, J.: Diet in Health and Disease, Ed. 4, Philadelphia, W. B. Saunders Company, 1913, p. 377.
18. Crohn, B. B.: Experiences with the Coleman-Shaffer Diet in Typhoid Fever, THE JOURNAL A. M. A., Jan. 27, 1912, p. 259.
19. Rodgers, G. C.: General Diet in Typhoid Fever, Report of Two Hundred Cases, Virginia Med. Semimonth., 1912-1913, xvii, 61.
20. Schottmüller, H.: Die typhösen Erkrankungen in Mohr and Staehelin: Handbuch der inneren Medizin, 1911, i, 504.

INDIVIDUALIZATION

Now that the pendulum has swung toward a high-calory diet in typhoid, the necessity of individualization should not be lost sight of. McCrae has pointed out the dangers of overfeeding in certain cases. I am convinced that there are some patients who cannot bear the high-calory diet; indeed, in our experience at the Johns Hopkins Hospital the resident physician, Dr. Clough, has found it difficult, in the early stages of the disease, to give as large amounts as seem easily possible in the New York Clinic, and we have had some patients to whom a large number of calories could not, we have thought, be administered wisely before the beginning of convalescence. Here good clinical judgment is essential. It is often very difficult, it is true, to say whether in a given case a digestive disturbance or a tympanites is due to some article of the diet or to a high grade of intoxication. I have obtained the impression myself that the severer forms of tympanites depend less on the food intake than on toxic paresis of the wall of the intestine due to a virulent infection or a low grade of resistance. Should tympanites or other digestive disturbances begin to appear, however, it is well to modify the diet at once and especially to restrict the intake of milk and of lactose. If, on the high-calory diet, examination of the stools shows that undigested food is passing through, the diet should be reduced.

A point emphasized by Coleman, the necessity of beginning cautiously and gradually increasing the caloric value of the intake, should be kept in mind. The plan Coleman recommends is to give a pure milk diet for two days in all cases. If the patient be very ill, he may be kept, thereafter, on a fluid diet of from 1,000 calories (1 liter milk, 50 c.c. cream, 50 gm. lactose divided into eight feedings), up to 3,900 calories (1.5 liters milk, 0.5 liter cream, and a pound of lactose, divided also into eight doses) in the twenty-four hours. Soft-boiled or scrambled eggs may be added to this diet even when patients are quite sick. In mild cases, the patients may from the beginning take, in addition, buttered toast, mashed potatoes and cereals in amounts sufficient to make the total caloric intake 4,000 per day. In convalescence 5,000 or 6,000 calories per day may often be given.

The contributions of trained dietitians to the technic of administering a high-calory diet are very welcome. The attractive dishes devised by Miss Edna Cutler,[21] formerly of Bellevue, make a good start in this direction, and it is to be hoped that the dietitians in various hospitals will gradually supply us with a whole series of appetizing dishes which may be given without harm to our typhoid patients. In this connection I have found the cook-book of Jürgensen[22] a valuable aid. I wish it could be translated into English, as the caloric content of each recipe is given. In calculating the caloric content of ordinary foods the little book by Locke[23] on "Food Values" is most helpful.

CLINICAL RESULTS

The careful analysis of the patients in Bellevue Hospital showed a lower mortality among the patients fed on the high-calory diet than among the other cases. Complications (hemorrhage; perforation) and relapses were no more frequent than in patients fed in the old way. The great gain from the liberal diet consists in the lessening of emaciation, the shortening of convalescence and the prevention of exhaustion phenomena after the disease has run its course. Most patients lose 5 or 10 pounds even on the high-calory diet, though now and then a patient can maintain his weight. In the Johns Hopkins Hospital we have been struck with the better appearance of our patients during convalescence since we have fed our patients more liberally. Since convalescence can be shortened and emaciation prevented, there is good reason to believe that post-typhoidal psychoses and post-typhoidal neurasthenic states will be less common than under the old regimen. It is a little too early yet to speak positively regarding this point, but my clinical impression thus far favors the view stated.

In order that the high-calory diet may be successfully given, the details of the nursing must be carefully worked out. The times of feeding during the day and night, the relations of the food intake to the water intake, the quantities given each time, the variety of the food given, the estimation and recording of the calories in a special chart, the regular weighing of the patient, the encouragement of the patient, the tact and judgment of the nurse, are all points to be considered.

The high-calory diet in typhoid will be objected to by many patients, by many nurses, and by many physicians. It is no wonder that prejudice against it should be deep-seated, if we recall the past history of the dietetic treatment of typhoid fever. This prejudice is contributed to by false ideas regarding the character of the intestinal contents in typhoid and their relation to the ulcers. It is contributed to by an old fallacy—the argument *post hoc, ergo propter hoc*—which ascribed hemorrhage, perforation and relapse in typhoid to dietetic errors because they sometimes followed them. There are physicians in practice to-day who still believe it almost criminal to permit a typhoid patient to eat a piece of dry toast even when it is thoroughly masticated. Perforation will occasionally occur, it is true, after a patient has eaten dry toast, but this observation is far from establishing a causal relation between the two events.

As Dr. Edsall is to deal especially in this symposium with the dietetic limitations in certain cases of typhoid fever, I shall leave this side of the subject to him to present.

In conclusion, then, the evidence is at present in favor of the liberal feeding of typhoid patients, provided always that the diet be adapted to the needs and powers of the particular patient under treatment with avoidance of anything like a rigid routine applied to all cases indiscriminately.

Johns Hopkins Hospital.

21. Cutler, Edna, Cited by Coleman, Note 11.
22. Jürgensen, C.: Kochlehrbuch und praktischer Kochbuch, Berlin, J. Springer, 1910.
23. Locke, E. A.: Food Values: Practical Tables for Use in Private and Public Institutions, New York, D. Appleton & Co., 1912.

Child Psychology and Education.—Normal children are neurologically incapable of following the logical sequence of ideas as generated by the adult. Their thought is unstable and incomplete because the association fibers in the brain are only in the process of development, are only as yet parts of an unfinished machine. A knowledge of this physical fact throws a light upon the state of mind which perpetrates the schoolboy "howler." "The weight of the earth is reckoned by comparing a mass of known lead with a mass of unknown lead," may produce a smile from the "man in the street," but the student of child life sees evidence of mental strain, confusion of ideas and only a partial absorption of an education which deals with *words* instead of *things*.—John Arrowsmith, *Jour. State Med.*

THE EFFECTS OF FOOD ON METABOLISM IN TYPHOID FEVER*

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After it had been ascertained that a patient could be carried through an attack of typhoid fever with the loss of but little if any weight and that the large amount of food required for this purpose is absorbed nearly as completely as in health, the next step in the investigation of the diet problem in this disease was obviously to determine the extent to which the food was utilized after its absorption and the effect it had on the general metabolism.

The investigation which forms the basis of this paper was undertaken in association with Dr. Eugene F. Du Bois.[1]

There are two methods by which such an investigation may be carried out: direct or indirect calorimetry. Direct calorimetry implies the actual measurement of the heat produced by the body and requires an elaborate and costly apparatus. In indirect calorimetry the heat production may be calculated from the oxygen consumption and the carbon dioxid output, making allowance for that portion of the respiratory exchange which is due to protein metabolism.

Several types of apparatus have been devised for measuring the amount of oxygen absorbed and the amount of carbon dioxid given off during predetermined periods of observation. The apparatus which we employed and which we believe to be the most accurate is the Benedict "universal" or "unit" apparatus. A brief description of it will facilitate the discussion of the results which were obtained. The diagram is schematic. The machine consists of a closed circuit of tubes in which are interpolated a blower (*E*) to maintain an efficient circulation of air, two Williams' sulphuric acid bottles (*A* and *B*) to absorb the water-vapor of the breath, a bottle of soda lime (*S*) which takes up the carbon dioxid, a third bottle of su'phuric acid (*C*) which absorbs the water driven over from the moist soda lime, and a water-bottle (*F*) to moisten the air before its return to the respiratory passages. Fresh oxygen is admitted at O_2. Expansion of the circuit is provided for by means of a rubber bag (*D*) or a spirometer which rises and falls with expiration and inspiration respectively. The patient is connected with the apparatus by means of rubber tubes (1 and 2) which are inserted into his nostrils and made air-tight. The patient's mouth is sealed with adhesive plaster to prevent his opening it through inadvertence or through falling asleep.

When a patient is connected with the machine it is obvious that the only substances he can add to the air in the circuit are carbon dioxid and water; the only thing he can take from it is oxygen. The loss of weight by the oxygen-container and the gain in weight by the soda lime bottle (plus sulphuric acid bottle *C*) correspond to the amounts of oxygen absorbed and carbon dioxid given off during the period of observation. It may be added that the observations were made in periods of fifteen minutes each.

Kraus[2] was among the first to study the total metabolism in typhoid fever. He found that the metabolic processes do not depart essentially from the normal, and that the respiratory quotient in the postabsorptive (*nüchtern*, fasting) state corresponds to the nutritive condition of the body at the time of the observation, that is, to the completeness with which the storehouses have been filled. Following Kraus came a number of investigators (Regnard, Riethus, Rolly and Meltzer and others[3]) who, though working with different types of apparatus, obtained respiratory quotients which were so low that it was necessary to assume the occurrence of abnormal processes of metabolism in fever to explain them. This lack of confirmation cast doubt for a time on Kraus' conclusions, but the work of the last few years (Grafe[4], Rolly[5]) is in agreement with that of Kraus, and the conclusion appears to be inescapable that the abnormally low quotients were due to some undiscovered error of technic.

Our studies of the total metabolism in typhoid fever were begun in the fall of 1911 and have been continued through each succeeding typhoid season.[6]

Since the investigation was undertaken primarily to determine whether the high-calory diet exerted any deleterious influence on the patient and whether and in what manner the food was utilized after its absorption, practically all of the observations were made shortly after a meal, on patients who had been receiving large amounts of food. This fact should be borne in mind in comparing the results with those of previous investigators whose patients had been without food for from six to fourteen hours.

HEAT PRODUCTION

The total metabolism, or heat production, was calculated from the oxygen consumption and the respiratory quotient, since the caloric value of the oxygen varies with the height of the quotient. Heat production is expressed in terms of calories per kilogram per day or per square meter of body surface per hour or day. The latter method is the more accurate but is less practical for routine clinical work.

Febrile Period.—The heat production of the high-calory cases (fifty-five observations), averaged for the entire febrile period, was 35.9 calories per kilogram per day.

The heat production in the postabsorptive state (fifty-one observations by other investigators), likewise averaged for the entire febrile period, was 35.3 calories per kilogram per day.

In both groups of cases there is an increase in heat production (35.4 per cent. and 33.2 per cent. respectively) above the average (26.5 calories per kilogram per day) of seventeen normal persons for the most part collected from the literature to serve as controls. But the increase in the high-calory cases over those in the postabsorptive state is only 1.7 per cent, and lies within the limits of error.

It is evident, therefore, that even large amounts of food (at least, when the protein is kept relatively low) do not increase the heat production, or the fever, in the febrile stage of typhoid.

In health the taking of food is followed by an increase in heat production which, according to

* Read before the Section on Pharmacology and Therapeutics at the Sixty-Fifth Annual Session of the American Medical Association, Atlantic City, N. J., June, 1914.

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1. The detailed results of the investigation will appear shortly in the Archives of Internal Medicine.

2. Kraus: Ztschr. f. klin. Med., 1890, xvi, 160.

3. For these and other references, see Grafe (Deutsch. Arch. f. klin. Med., 1909, xcv, 544).

4. Grafe: Deutsch. Arch. f. klin. Med., 1910, ci, 209.

5. Rolly: Deutsch. Arch. f. klin. Med., 1911, ciii, 93.

6. During the season of 1913-14 the calorimeter, constructed in the Second Medical Division of Bellevue Hospital under the auspices of the Russell Sage Institute of Pathology, was employed. The results obtained with its aid will form a separate communication.

Rubner, is due to its specific dynamic action, and it has simply been assumed that food exerts such action in fever. Many years ago von Hoesslin estimated the supposed increase in metabolism at 10 per cent. to 15 per cent. and later writers accepted his estimate.

The reason food does not exhibit its specific dynamic action in typhoid fever can, at the present time, only be conjectured. It is not without analogy, however, for in health the specific dynamic action of food does not appear when metabolism is stimulated by external cold.

Convalescence.—The heat production of the high-calory cases was essentially uniform in the first four weeks of convalescence. The average of forty-nine observations covering these weeks was 36.2 calories per kilogram per day. This is 36.6 per cent. above normal and slightly less than 1 per cent. above the heat production in the febrile period.

The reason for the persistence of such a high metabolism into convalescence has not been definitely ascertained. Since the temperature remains normal and the patients show steady improvement in weight and strength and appearance, however, there is no present reason to consider that the high metabolism contra-indicates the liberal use of food.

In the postabsorptive state, in the case of patients who have received insufficient food during the fever, the metabolism increases with each week of convalescence, at least up to the fourth, as is shown in the following averages: In the first week the average of 25 observations was 26.9 calories per kilogram per day; in the second week, the average of 18 observations was 28.3 calories; in the third week the average of 15 observations was 29.7 calories; in the fourth week the average of 24 observations was 30.6 calories.

Since, under the older methods of dieting, the total food is gradually increased as convalescence progresses, the increasing metabolism may be considered to represent the specific dynamic action of the food.

THE RESPIRATORY QUOTIENT

The relation of the carbon dioxid output to the oxygen consumption constitutes the respiratory quotient, $\frac{CO_2}{O_2}$, which, together with the nitrogen of the urine, furnishes information respecting the nature and amounts of the substances which the body is consuming.

The chemical composition of carbohydrate is such that when it is completely oxidized to carbon dioxid and water, either within or outside of the body, the volume of carbon dioxid produced and of oxygen consumed are exactly equal; consequently, the quotient is 1.0. When fat alone is completely oxidized to carbon dioxid and water, the quotient is 0.7. When protein alone is oxidized to urea, the form in which the greater portion of it leaves the body, the quotient is 0.8.

But the body in its metabolic activities always utilizes more than a single foodstuff and the value of the respiratory quotient varies according to the proportions of protein, fat and carbohydrate consumed; the greater the proportion of carbohydrate, the higher the quotient. Quotients over 1.0 are obtained during the transformation of carbohydrate, an oxygen-rich body, to fat, which is oxygen-poor. According to current belief, the respiratory quotient never falls below 0.72 in fever.

Febrile Period.—In the febrile period the average respiratory quotients of the high-calory cases rose steadily from 0.83 in the earlier stages to 0.88 in the later. The average quotient for the whole period was 0.86.

The average respiratory quotients of the postabsorptive cases exhibited a tendency to fall. Though the fall is slight it suggests the gradual depletion of the glycogen reservoirs in consequence of the insufficient food-supply. The average quotient for the whole febrile period was 0.767.

This difference of nearly 10 points in the average respiratory quotients of patients after food and in the postabsorptive state is very significant. Since the height of the quotient corresponds to the relative proportion of carbohydrate consumed, the higher quotient of the high-calory cases clearly indicates that the body utilizes carbohydrate when it is available in preference

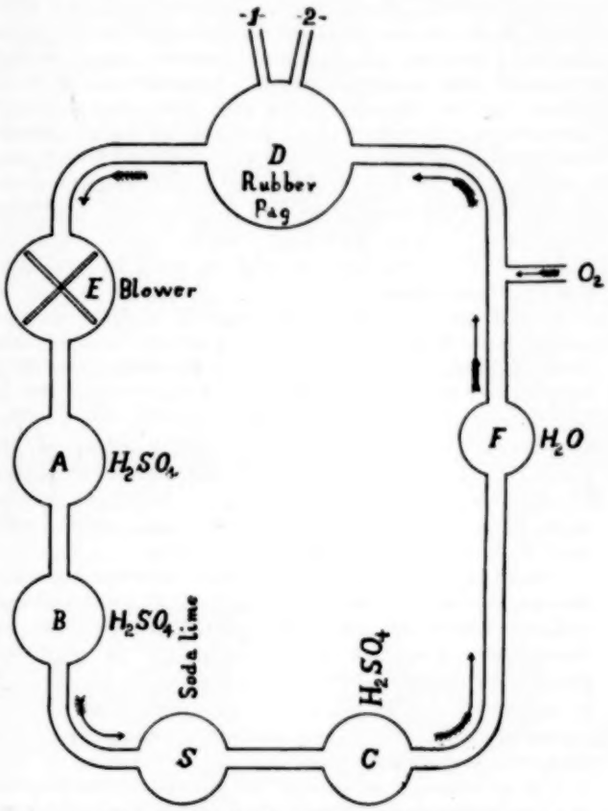

Diagram of the Benedict "universal" or "unit" apparatus for measuring absorption of oxygen and output of carbon dioxid.

to fat or protein for the increased production of energy in fever just as it does in health when called upon to perform extra work.

Convalescence.—In the first week of convalescence the average respiratory quotient after food was 0.93. In the second week the average had risen to 1.01, indicating that, in some cases, the formation of fat from carbohydrate was in progress. In the third and fourth weeks the quotient fell, the averages being 0.95 and 0.91 respectively.

In the postabsorptive cases the respiratory quotient rose steadily during the first four weeks of convalescence, the averages being 0.82, 0.84, 0.92 and 0.96. The rise corresponds to the increase in the food as convalescence progresses.

Though the formation of fat was observed in a few patients in the earlier weeks (in the first in two of Grafe's and one of Rolly's) the respiratory quotient

indicates that the food was still insufficient to meet the ordinary demands of the body for energy, and, at the same time, to permit the replenishment of the stores of fat and glycogen until the fourth week had been reached or even later.

GENERAL CONSIDERATIONS

We may apply the facts which this study has brought out, together with others previously ascertained, to the dietetic requirements of the typhoid patient in the following manner:

The increase in total metabolism which occurs in typhoid fever creates a demand for more food than would be necessary to maintain the same individual in equilibrium in health, if he were confined to bed. The average increase during the course of the fever reaches about 34 per cent., but, for reasons which are not yet apparent, an amount of food which is just sufficient to cover the heat production will not protect the body protein. It has been pointed out on other occasions that a much greater quantity of food is necessary for this purpose, and that the quantity varies with different patients. Rolland[7] succeeded in establishing nitrogen equilibrium with 45.5 calories per kilogram per day, but Shaffer and Coleman[8] were unable to accomplish it in any patient with less than 58 calories; in one patient 85 calories[9] were required, and in others even this quantity of food did not suffice for the purpose.

It will scarcely be denied that a typhoid patient should receive in his food enough energy to cover his heat production. This amounts on the average to 35.9 calories per kilogram per day when the patient lies at complete rest, quietly breathing into the respiration apparatus. Under ordinary conditions, however, he moves about the bed more or less and thereby increases his metabolism at least 10 per cent. Therefore, on the basis of heat production alone, the food should furnish 39.5 calories per kilogram per day.

But since such an amount of food will not maintain the patient in nitrogen equilibrium, these questions present themselves: Shall the typhoid diet be arranged merely to cover the heat production, or shall the attempt be made, by giving more food, to protect the body protein? The results of this particular investigation do not furnish the answer; it must be drawn from other sources.

The production of energy is not the sole purpose of food. Food must maintain the body in a condition of equilibrium or illness, if not death, will follow.

While it is true that countless numbers of typhoid patients have survived the loss of large amounts of body protein, drawn, for the most part, from their muscles, may it not be equally true that many have died because the loss was not prevented? A normal man who is losing protein nitrogen is not receiving sufficient food. Such persons are notoriously less able than those in perfect health to resist invasion by pathogenic bacteria, or successfully to combat disease. A typhoid patient who is losing nitrogen is consuming his own tissues to supply the deficit in his food. And since it has been found possible to prevent this drain I am firmly of the opinion that the patient's best interests are conserved by giving sufficient food for the purpose, providing in all instances that the digestive organs are capable of handling it. The patients who have come under my observation have been in better condition, the more nearly nitrogen equilibrium has been approached, and they have lost weight until this condition has been reached.

In this connection it may be recalled that a normal man cannot be maintained in nitrogen equilibrium if he receives only sufficient food to cover his basal heat production. This is due to the specific dynamic action of the food, or, as Lusk has shown, to the stimulation of metabolism by the excess of metabolites in the circulation. The reason that a typhoid patient cannot be maintained in nitrogen equilibrium on an amount of food which just covers his heat production has not yet been discovered.

The high quotients of the high-calory cases during the course of the fever have a practical relation to the selection of foods for the typhoid patient. As already pointed out, the height of the quotient is proportional to the amount of carbohydrate which is consumed. In our observations the quotient invariably rose after a meal containing carbohydrate. In one patient, a boy of 17 years, it rose on the fourth day of a relapse to 1.04 while the temperature was 102 F. The explanation of this is that the glycogen stores had been replenished during the preceding afebrile period, the food which the boy had received before breathing into the machine contained more carbohydrate than he needed for his energy exchanges, and a portion of it was transformed into fat.

This observation possesses very great interest in that it illustrates that the constructive processes of metabolism may be called into play even in the presence of fever. No reason is apparent why, if sufficient carbohydrate is supplied during the original fever, the same transformation might not occur. When a patient comes under treatment early in the disease the desirability of attempting to add to his store of fat may well be questioned. When, however, a patient has lost much weight I believe that the attempt should be made to bring the constructive processes into action even though fever is present.

The foregoing discussion should not be construed as the expression of an opinion prejudicial to the value of fat. The rôle of fat in the fever diet has not yet been completely learned. Observations designed to test its value are already under way and others have been planned. At present I am in position to say only, on the basis of clinical experience, that I believe fat to be an important constituent of the diet. In the case of patients who cannot take much carbohydrate it serves to keep up the energy value of the food and, so far as clinical observation tells, to maintain the patients' nutrition. In other patients it appears to be a physiologically economical way of increasing the total food intake.

These opinions derive support from the fact that the more intimately the processes of metabolism in fever are understood, the more nearly are they seen to approach normal. With the exception of the unexplained need of the typhoid patient for an excess of food over his heat production in order to maintain nitrogen equilibrium, the only difference, which may be considered to have been clearly established between the metabolic processes in fever and in health, is a difference in intensity.

CONCLUSIONS

1. Food does not increase the heat production or the temperature in typhoid fever, even when given in

7. Rolland: Deutsch. Arch. f. klin. Med., 1912, cvii, 440.
8. Shaffer, P. A., and Coleman, W.: Protein Metabolism in Typhoid Fever, Arch. Int. Med., December, 1909, p. 538.
9. In some of these cases the carbohydrate calories alone, in the food, reached 50 and more a day.

large amounts (at least, when the quantity of protein is kept relatively low). Therefore, the fear which has been entertained by physicians for so many years that a liberal diet would raise the temperature of the patient is proved to be groundless.

2. The body utilizes carbohydrate in preference to fat or protein to meet the increased demand for energy in typhoid fever just as it does in health when called on to perform additional work. Consequently, carbohydrate should occupy a prominent place in the diet.

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ABSTRACT OF DISCUSSION

ON PAPERS OF DRS. BARKER AND COLEMAN

DR. LAWRENCE LITCHFIELD, Pittsburgh: I do not think enough stress has been laid on the way in which the high-calory feeding should be instituted, the time it should be commenced, and its gradual development. In the early stages of the fever when the patient is first stricken, with coated tongue, anorexia, etc., food is distasteful and it is almost impossible to get patients to take it, but if their digestive apparatus is treated with respect during the first stage, it is not long before the patient will begin to have an appetite and a cleaner tongue. Then is the time to begin feeding, and the amount should be increased gradually with the patient's increasing ability to take care of it. Milk in typhoid fever is regarded as a liquid food, while in reality it is sometimes the most solid food we could give. There is nothing more resistant than the curds sometimes found in typhoid stools. Another danger of the milk in cities where it is usually pasteurized is that the lactic-acid bacillus is killed, but the more dangerous spores are not killed and the milk may become very toxic with the warning sourness. Some years ago we had in Pittsburgh the most beautiful place to study typhoid fever and just before taking up the more liberal feeding of typhoid patients, I had two hundred patients on fermented milk which I fortified by the addition of cream and sugar of milk, with excellent results. Milk that is fermented does not form the large curds in the stomach, and except in rare cases it is easily borne by the patient and readily taken. I gradually increased the liberality of my diet and in 1908 or 1909 was giving toast, scraped meat, eggs, etc. The patient should be given things on which he can chew. Mastication helps to keep the mouth and tongue clean and stimulates appetite and digestion. With patients who do not take food readily, when we are at a loss to introduce a sufficient number of calories, I have, in some cases, been pleased with the results of glucose solutions given by enteroclysis. In desperate cases I give dextrose in isotonic solutions intravenously, as much as 2 liters of a 5.1 per cent. solution in twenty-four hours. When constipation is troublesome the feeding of fruit and vegetables is often not advisable, and in such cases I have found paraffin oil very satisfactory. I once had 150 consecutive cases of typhoid fever on small daily doses of Epsom salt. There were no accidents and no unusual percentage of sequelae and the mortality was lower or a little less than my average. I think, however, paraffin oil is better than Epsom salt for troublesome constipation in typhoid fever. My last patient was a young married woman, six months pregnant, with paratyphoid infection complicated by an acute hepatitis and cholecystitis. She was very sick, but, after the first few days, took a liberal diet and made an uneventful recovery.

DR. O. T. OSBORNE, New Haven, Conn.: Tympanites, which I believe is not a symptom, but a complication, is most important. It means a disturbed digestion, with fermentation, and it interferes with breathing, with the action of the heart, and vastly increases the danger of hemorrhage and perforation. Hence, tympanites should be prevented, if possible, and the diet and care of the bowels is all-important. Inflammation in the intestines in typhoid fever is a surgical process, and the cleaner the small intestine is, the better for the patient. I would not allow constipation or a diarrhea, except what may be termed a therapeutic diarrhea; namely, the bowels should be moved at the will or decision of the physician. I give calomel or castor-oil in the beginning of the disease, and every alternate day the bowels are moved by cascara, aloin, or a saline. On the intermediate day the nurse gives a rectal injection of 1 ounce each of glycerin and water. After the bowels have moved once thoroughly, or at most twice, I direct the nurse to give a tablet of morphin 1/10 grain. This will stop excessive action of the bowels and check peristalsis. The patient should have all the nutriment necessary to carry on all of his metabolism: I give a cup of coffee in the morning, with a little sugar in it; two cups of oatmeal gruel a day; and two whole eggs a day, either raw or poached. Raw egg-albumin, or egg-white, is not a satisfactory nutriment. If the patient is well enough to chew, he should have dry or buttered toast. He should also have, daily, the juice expressed from a pound of chopped beef which has been first covered with cold water, allowed to stand an hour, and then the whole juice and water expressed out. This amount of nutritive liquid may be served salted at two or three feedings. The patient should also have a pint of milk a day, the juice of one orange, and two or three tablespoonfuls of lime-water. If the tongue is much coated, the patient should have a little dilute hydrochloric acid after milk, eggs, or meat. If it is best not to administer meats or meat-juices, the patient should receive a small dose of iron each day, and my choice is *Eisenzucker*. If in spite of such care of the diet and the bowels, some tympanites develops, I use yeast or lactic-acid bacilli treatment.

DR. ALLAN C. EUSTIS, New Orleans: My experience was acquired in a large country practice after having had the disease itself. I had so much milk poured into me that I became nauseated at the sight of it, and about the tenth day I wanted carbohydrates in the form of toast and molasses, etc. In my practice in the country I began to feed my patients, more especially on carbohydrates, when Dr. Coleman's work came out. I have since been an ardent advocate of his principles. I think we make the mistake of paying too much attention to quantity and not enough to quality. I believe tympanites is not a symptom but a complication, and, further, that the dry, coated tongue is also a complication, and can be cleared up by the proper dietetic measures. In the last three years I have collected twelve cases in which we have kept the patient's tongue dry and clean, simply by a properly selected diet. Analyses of the gas passed by the rectum in several cases have shown carbon dioxid as rare, hydrogen sulphid and methane predominating. I do not believe, therefore, that carbohydrates cause tympanites, but consider protein putrefaction as responsible. A high indican test is an indication to take the patient off of protein and substitute carbohydrate in any easily digestible form, such as sugar, toast, mush, cream of asparagus, soup, gruels, etc. A patient should be given three meals a day and should be treated the same as a healthy person, allowing ample time at night for sleep. In this way you do not tire out the gastric juice, and the caloric content can be kept up by giving fruit juices with sugar of milk between meals. I have often allowed patients to take a cocktail before their meals if they have been used to it. Frequent examinations of the twenty-four-hour nitrogen output of these cases showed that they do well with 5 to 10 gm. of nitrogen per day. Intestinal poisons must always be considered when treating a typhoid patient, and I would recommend the daily examination of the urine for indican, which, when present, should be eliminated by a lowering in the protein of animal origin.

DR. LEWELLYS F. BARKER, Baltimore: The three striking changes, clinically, in the appearance of typhoid patients in hospitals are (1) the changes in the tongue; (2) the lessening of the tympanites, and (3) the prevention of extreme emaciation. We do not see the old "typhoid tongue" any more. We rarely see marked tympanites, with careful feeding; occasionally, however, we do see it. I hope some one will find out how always to prevent tympanites. Only last week, a close friend of mine died from typhoid with tympanites and per-

foration, temperature 106. If we could have prevented the tympanites in this case he might have lived, but I think he had toxic paralysis of the walls of the intestine. I think bacteriologic study throws some light on relapses. In the first week of the disease, there are always large numbers of typhoid bacilli in the blood; there are relatively few in the second and third week. There is a new bacillemia with every relapse. We clinicians feel that a great debt of gratitude is due to the men who carry out the careful metabolic studies on which improvements in therapy can be based. The final judgment has, however, to be made by the clinical men who apply these studies in the actual treatment of a large series of cases. The laboratory research must be followed and supplemented by clinical research—the testing by actual observations, at the bedside, of the applied findings.

DR. WARREN COLEMAN, New York: Few points remain to be considered. The first concerns the remark of Dr. Barker concerning the possible objections to the use of the high-calory diet. He suggested that some nurses complain of the amount of work which the diet entailed. Without exception, the nurses to whom I have spoken of the matter have agreed that the preparation of the food was less troublesome than the care of patients under the older methods of dieting. The high-calory patients are rarely delirious and they rarely suffer from diarrhea, whereas, formerly these symptoms were common and often demanded a nurse's whole attention. The objection to fermented milks is that their fuel value has been reduced by the removal of the milk-sugar. With a diet in which proteins predominate the putrefactive organisms dominate the flora of the intestine. In the presence of large amounts of carbohydrate the fermentative type predominates. This is an additional reason for keeping the protein low—from 10 to 15 gm. of nitrogen in twenty-four hours. I believe that in most cases tympanites is due to injudicious dieting. I never give laxatives or purgatives in typhoid. A simple enema every morning empties the lower part of the intestine and answers every purpose.

THE PSYCHOSIS OCCURRING DURING THE COURSE OF PERNICIOUS ANEMIA

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In reporting the two following cases I wish to call attention to the abnormal *mental* condition occurring during the course of pernicious anemia, not coming especially as one of the final complications of the disease. It is perhaps of little moment to see such a condition occurring as one of the late complications, but we infrequently read in the literature of a well-defined psychosis making its appearance weeks and months previous to the death of the individual.

CASE REPORTS

CASE 1. (No. 8043).—Male, white, aged 52, farmer. Admitted to the Columbus State Hospital Dec. 24, 1912. Commitment papers state that the "onset has been gradual, that he is suffering from pernicious anemia with peripheral neuritis, is at times excited and dangerous, threatening to kill different members of the family. Has hallucinations and thinks that different persons were trying to kill him. Is insanely jealous of his wife; at times having violent, mad fits." When admitted to the hospital the patient appeared intensely sick and was unable to walk without assistance, having marked dyspnea on the slightest exertion. He was at once placed in bed and the initial examination showed him to be a man of quite marked intelligence, possessing quite a little insight into his present condition, oriented as to location and apparently well satisfied. He realized that he was quite sick physically and desired to do all that he could to improve his condition.

From his history we learn that he has been quite a prosperous man and for many years his married life was happy. Finally, of his own accord and for no real cause he separated from his first wife. He soon married, but his second union had been unhappy. For the past few weeks he had been very suspicious of his second wife, thinking that she was trying to poison him, or in some other way cause his death. He gave as his reason for such belief that his second wife had always been jealous of his first one. He also stated that because he had quite an estate his second wife was anxious that he die so that she would fall heir to his property. At different times during the examination he would close his statement with the remark that "although this seemed very real to him it must certainly be imaginary." He showed very little difficulty in speech, pronouncing test phrases quite well. There were never any convulsive attacks, blind or dizzy spells, and he claimed that he had never had any defect of memory.

In about three weeks after the first examination the patient showed some marked changes both physically and mentally. He was well oriented as to place but could not remember how long he had been in the hospital. At this time there was also some indecision in his own mind as to whether or not he had had any real mental trouble. He could see no reason why he should have been brought to the hospital. He grew very toxic at intervals, so that he was confused and disoriented in every field. When aroused from his lethargy he recognized those about him, but when left alone, soon relapsed into a semi-conscious condition. The functions of the arms and legs became less and less efficient and for two or three weeks previous to his death he was almost entirely helpless. He died March 17, 1913, three months after admission. When admitted physical examination was as follows:

Physical Examination on Admission.—Patient is 5 feet 5 inches in height, weight 131 pounds, light hair, blue eyes, pupils dilated equally, tongue clean, dark red in color; skin is clean, somewhat tinted with yellow, musculature very flabby, breath has bad odor, inguinal and postcervical glands enlarged, liver dulness increased downward. Examination of chest negative. Nervous system: right patellar tendon more active than the left, marked ankle-clonus of the right side. Romberg's sign present. Gait unsteady. At the time of admission to the hospital blood examination was practically negative, but from an examination made Oct. 15, 1912, by Dr. Frank Winders we learn that the hemoglobin was 40, red blood-cells 1,750,000, whites 5,200. Differential count—polynuclears 48, small mononuclears 40, large mononuclears 7, eosinophils 2, megaloblasts 3, normoblasts 4, 100 whites; color index plus; polychromatophilia, poikilocytosis. At the time of this examination patient was of a pure lemon tinge, there was marked throbbing of the muscles of the neck, severe dyspnea, palpitation of the heart and digestive disturbances. The heart was dilated. A loud systolic murmur was heard all over the cardiac region and transmitted to the large vessels of the neck. Blood-pressure 105. Pupils sluggish, no patellar reflexes present and there was some unsteadiness of the limbs and feet. The diagnosis was pernicious anemia with very unfavorable prognosis; in fact, the patient was not expected to live more than three or four weeks. It was possible to obtain consent for only a partial necropsy.

Necropsy.—All the fatty tissue showed the characteristic lemon color. The left kidney was malformed, showing some old scars or contractures. The spleen was enlarged and intensely congested—a large splenic tumor. Liver was enlarged, markedly congested. Gall-bladder distended with bile, but no stones. Lungs on each side contained air but were bound down by adhesions. The heart was smaller than normal and full of clot; pericardium very yellow. The intercostal as well as the other muscles examined were of a deeper red color than normal. The brain and spinal cord were not examined. Other organs were opened *in situ* and replaced. From the gross examination the diagnosis of pernicious anemia was made.

CASE 2 (No. 8205).—Male, white, aged 55, farmer; committed to the Columbus State Hospital June 14, 1913. The commitment papers stated that he was excited, had delusions concerning his previous medical treatment and also at times had delusions of persecution and of accusation. He, at

times, manifested quite marked mental disturbances. According to the statements of the committing physicians he was thought to have advanced pulmonary tuberculosis.

When admitted to the hospital the patient was quiet and well behaved. He was placed in bed and given the usual routine treatment and the preliminary examination revealed the following mental state:

Preliminary Examination.—"The patient is unable to tell where he is, the day, the month, or the year, and concludes his answers with 'I have been doped up so much that my ears ring.' He confuses his present location with the place—county infirmary—where he had been an inmate several weeks previously. He insists that he has had no trouble with his mind and that the immense amount of medicine he has taken is responsible in every way for any peculiar symptoms he may manifest. Although he complains of some roaring in his head he has no clear-cut hallucinations. His memory shows lack of accuracy for both recent and remote events and his general mood is much happier than his physical condition would warrant."

Examination.—A month after his admission he still showed temporal, spatial and personal disorientation. During a conversation he disclosed delusions of persecution, hallucinations of sound and illusions, and during the entire examination there was failing attention and lack of appreciation of his condition. He was much reduced physically and the skin showed a well pronounced lemon yellow tint. Aside from some slight paresthesias the nervous system was negative. The blood examination at this time showed a marked pernicious anemia.

During the last two or three weeks of his illness he manifested marked signs of cerebral anemia, the roaring in his head becoming much more severe, vertigo was constant and unless assisted he was not able to walk. His sensibilities were diminished and he gradually grew so clouded that he could not converse with those about him. Death occurred Aug. 4, 1913, about seven weeks after admission. There was no necropsy.

DISCUSSION

When we attempt to classify these two cases we find no definite group in which to place them, unless it should be with the intoxication psychoses. To summarize, we have two individuals with well defined pernicious anemia, showing in common many mental signs, namely, lack of orientation—in the one case in every field and in the other especially in regard to place; lack of insight; such delusions as we commonly meet in paranoid states—those of a persecutory type; the memory in one case apparently normal, until late in the condition, while in the other there was lack of accuracy for both recent and remote events; the mood in both parties much happier than the physical condition would warrant; lack of attention and appreciation, and numerous physical signs such as parasthesias, diminished sensibilities, vertigo, speech disturbances, loss of functions of the arms and legs, ankle-clonus, unequal patellar reflexes, Romberg signs, unsteady gait. Apart from the abnormal mental conditions present it is evident that we are dealing with some lesions of the brain and spinal cord, such as have been described by various writers in their reports of cases.

Hereditary Development and Differentiation.—Heredity may be defined as the particular germinal organization which is transmitted from one generation to the next. Inheritance or heritage is the sum of all those qualities which are determined or caused by this germinal organization, by which it is transformed into the adult organization. Differentiation is the formation and localization of many different kinds of substances out of the germinal substances, of many different structures and functions out of the relatively simple structures and functions of the oosperm.—Edwin Grant Conklin, *Pop. Sc. Month.*

THE BACTERIOLOGY OF TYPHUS FEVER *

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The relatively recent experiments of Nicolle,[1] Ricketts and Wilder,[2] Anderson and Goldberger,[3] revealing the manner in which typhus fever was borne from patient to patient by lice, and the later investigations of Anderson and Goldberger[3] proving the identity of Brill's disease with typhus fever, have aroused new interest in this disease and the next step toward the solution of its etiology, the discovery of the specific germ, is awaited expectantly.

The bacteriology of typhus has been studied for years and numerous investigators have reported the discovery of organisms in typhus blood. No one of them, however, has thus far been able to establish the specificity of any particular organism. In general the students of the disease may be grouped into two camps, the one championing a protozoan etiology, the other maintaining that typhus is caused by a bacterium.

Among the first important investigations were those of Hlava[4] (1888), who grew a streptobacillus from the blood and spleen of twenty of thirty-three patients, but who considered more important a protozoan which he later (1892) advanced as the cause of typhus. Thoinot and Calmette[5] in 1891 found small, actively motile threads, flagellates, which disappeared from the blood in twenty-four hours, and Gotschlich[6] described minutely an intracorpuscular protozoan which he classified as "pyroplasma bigeminum." Dreyer,[7] Kireef[8] and others were unable to confirm these observations. More recently Krompecker, Goldzieher and Augyan[9] obtained a variety of different organisms from the blood, streptococci, and staphylococci, Friedländer's bacillus and others, but considered more important than these bacteria certain structures resembling malarial plasmodia which they found both within the blood corpuscles and free in the plasma; oval, pear-shaped and rod-like bodies taking an intense blue stain with Giemsa. Very recently Hegler and von Prowazek[10] have described minute bodies filling many of the leukocytes and found also free in the plasma, taking a deep red stain with Giemsa considered to be strongyloplasma. They were found both in patients and in infected apes, but not constantly.

* From the Memorial Institute for Infectious Diseases, Chicago.

1. Nicolle, Compte and Conseil: Transmission experimentals du typhus exanthematique par le pou de corps, Compt. rend. Acad. d. sc., 1909, p. 149.

2. Ricketts and Wilder: The Transmission of the Typhus Fever of Mexico (Tabardillo) by means of the Louse (Pediculus Vestimenti), THE JOURNAL A. M. A., 1910, xiv, 1304; The Etiology of the Typhus Fever (Tabardillo) of Mexico City, THE JOURNAL A. M. A., 1910, liv, 1373.

3. Anderson and Goldberger: On the Infectivity of Tabardillo, or Mexican Typhus, for Monkeys and Studies on Its Mode of Transmission, Pub. Health Rep., 1909, xxiv, 1941; On the Etiology of Tabardillo or Mexican Typhus, Jour. Med. Research, 1910, xii, 409; The Relation of So-Called Brill's Disease to Typhus, Pub. Health Rep., 1912, xxvii, 149.

4. Hlava: Sur le typhus exanthematique, Semaine méd., 1889, p. 420; Centralbl. f. Bakteriol., Orig., 1902, xxxii, 27.

5. Thoinot and Calmette: Note sur quelques examens du Sang dans le typhus exanthematique, Ann. de l'Inst. Pasteur, 1892, vi, 39.

6. Gotschlich: Ueber Protozoen befunde (Apiosoma) im Blute von Flecktyphuskranken, Deutsch. med. Wchnschr., 1903, xxix, 329.

7. Dreyer: Untersuchungen über den Typhus exanthematicus in Egypten, Arch. f. Schiffs u. Trop. Hyg., 1911, xv, 319.

8. Kireef: Bakteriologische Untersuchungen des Blutes bei Flecktyphus, Centralbl. f. Bakteriol., etc., 1905, xxxviii, 518.

9. Krompecker, Goldzieher and Augyan: Protozoenbefunde bei Typhus exanthematicus, Centralbl. f. Bakteriol., Orig., 1909, lix, 612.

10. Hegler und von Prowazek: Untersuchungen über Fleckfieber, Berl. klin. Wchnschr., 1913, l, 2035.

The discovery that typhus is an insect-borne disease lent strength to the protozoan theory of its etiology because of analogy with such insect-borne infections as malaria, sleeping-sickness and relapsing fever. It is only more recently that instances of insect-borne bacterial diseases have come to light, but a consideration of these, of plague transmitted by the flea and rocky mountain spotted fever by the wood ticks, should warn against drawing too hasty conclusions about typhus.

Bacteria of all kinds have been described in the blood of typhus patients. Following Hlava came Lewaschew[11] in 1892 with cultures of micrococci and Dubief and Brühl[12] with delicate diplococci which were cultivated on the usual laboratory media. Balfour and Porter[13] in 1899 described a diplococcus. Deserving of greater consideration, however, are the more recent investigations of Galesesco and Slatineano[14] (1906), Klodnitsky[15] (1907), Rabinowitsche[16] (1908), Ricketts and Wilder[2] (1910), McCambell[17] (1910), Predjetschensky[18] (1910), Fürth[19] (1912) and Plotz[20] in 1914. All of these authors describe bacilli the descriptions of which bear a certain resemblance.

Galesesco and Saltineano[14] observed in fresh preparations of blood, elements 2 to 3 microns in length with refractile poles, non-motile, polar-staining. These observations were not constant. The same authors also described a large number of other bacteria.

Klodnitsky[15] in 1907 found thin bacilli in laked blood. In 1908 he obtained a culture of bacteria which proved highly virulent for mice. Artz and Kerl[21] were unable to confirm this observation.

Rabinowitsch[16] observed in the peripheral blood diplococci and rods which by Giemsa stain show a lighter middle zone. The cultures contained Gram-positive diplobacilli. In the first generation these were agglutinable by typhus serum, but not later, which is explained by Rabinowitsch in a subsequent paper by the sticky character of the colonies and the difficulty in making homogeneous suspensions. The cultures were pathogenic for guinea-pigs and rabbits, producing a disease much like typhus in man. Later, in 1912, Rabinowitsch obtained inconstantly a complement deviation, using an extract of culture as antigen. Cultures older than two months proved unavailable. The patient's serum (antibody) had to be taken not earlier than the sixth day of convalescence.

In December 1909 an investigation of typhus fever in Mexico City was undertaken by Ricketts and myself.[2] Blood serum of typhus fever patients was found to be sterilized by filtration through Berkefeld filters, an observation which was subsequently confirmed by others, and it was the encouragement offered by the results of these experiments that prompted the careful attention which we then bestowed on the microscopic examination of the blood of typhus patients and the organs of infected lice. If the organisms were large enough to be held back by the filter, they should be visible with the powers of the microscope. By these investigations we obtained results which were reported in April, 1910, as follows:

1. In the stained (Giemsa) preparation of the blood of patients, taken on from the seventh to the twelfth day of the disease, we invariably have found a short bacillus which has roughly the morphology of those which belong to the "hemorrhagic septicemia group." Usually it appears to stain solidly, but on minute examination an unstained or faintly stained bar is seen to extend across the middle. Occasionally two organisms are seen end to end. Exact measurements have not been made, but when compared with the size of the erythrocyte, their length is estimated at hardly more than two micromillimeters, and their diameter at about one-third of this figure. Certain other bodies, the identity of which is not so clear, may represent degeneration or involution forms of the above. They consist of two stained granules, connected by an "intermediate substance," which is stained faintly blue or not at all. Frequently one of these granules, or "poles," is larger than the other and stained a deep purple, whereas the smaller takes a faint blue color.

2. In moist preparations of the blood of patients, bacillary bodies, with a structure like that mentioned above, have been encountered in all cases. The differentiation of the forms into two halves, separated by a line or narrow zone of a substance of different refractive power, may be observed. They possess no active motility, but vibrate more or less rapidly.

3. The dejecta and various organs of a large series of lice have been stained in a similar way and examined for the presence of micro-organisms. Certain groups have been deliberately infected by permitting the lice to feed on patients, while others were supposedly normal, having been collected from healthy individuals. Streptococci, staphylococci, an oval bacillus occurring in clusters, and certain solid-staining bacilli are encountered irregularly and indifferently in the feces and intestinal contents of both "normal" and "infected" lice. Polar-staining organisms have been found occasionally in the feces and intestinal content of "normal" lice, whereas they are present almost constantly, and often in large numbers, in similar material from "infected" individuals.

Protozoa have not been recognized.

These observations were reached quite independently, as Rabinowitsch's publication in 1908 had not come to our attention and the more extensive reports appeared later.

During these earlier investigations I tried to obtain further proof of the specificity of our organism by making an emulsion of the organisms of infected lice in which the bacilli were numerous and attempting agglutination with serum from convalescent patients. These experiments were not reported, as they involved a rather difficult interpretation, the emulsions containing many contaminating bacteria. I felt, however, fairly convinced that the bipolar bacilli were agglutinated; the preparations with typhus serum differed markedly from the controls with normal serum.

Our investigations included the study of some thirty infected monkeys and a hundred or more patients and in every case blood cultures were made. As mediums agar and large flasks of broth were used and no cul-

11. Lewaschew: Ueber die Mikroorganismen des Flecktyphus, Deutsch. med. Wchnschr., 1892, xviii, 279.

12. Dubief and Brühl: Contribut à l'étude anatomo-patheologique et bactériologique du typhus exanthématique, Arch. de méd. exper., 1894, vi, 224.

13. Balfour and Porter: Edinburgh Med. Jour., 1899, vi, 522.

14. Galesesco and Slatineano: Recherches bactériologiques faites à l'occasion de l'épidémie de typhus exanthématique de Bucarest, Compt. rend. Soc. de biol., 1906, xxv, 14.

15. Klodnitsky: Russky Vratsch, 1907, p. 1008; Beobachtungen über Flecktyphus in Astrachan in den Jahren 1907-1909, Centralbl. f. Bakteriol., 1913, lxvii, 338.

16. Rabinowitsch: Ueber die Flecktyphusepidemie in Kiew, Centralbl. f. Bakteriol., Orig., 1909, lii, 173.

17. McCambell: Observations on Typhus Exanthematicus (Tabardillo) in Mexico, Jour. Med. Research, 1910, xxiii, 71.

18. Predtjetschensky: Zur Frage über den Flecktyphuserreger, Centralbl. f. Bakteriol., Orig., 1910, lv, 212; Weitere Untersuchungen über den Flecktyphuserreger, Centralbl. f. Bakteriol., Orig., 58, 1911, lviii, 106.

19. Fürth: Zur Bakteriologie und Epidemiologie des Typhus exanthematicus, Ref. Centralbl. f. Bakteriol., etc., 1914, li, 79; Neuere Untersuchungen über Fleckfieber, Arch. f. Schiffs u. Trop. Hyg., 1912, xvi, 241; Die Fleckfiebererkrankung des Frühjahrs 1911 in Tsingtau und Untersuchungen über den Erreger des Fleckfiebers, Ztschr. f. Hyg. u. Infectionskr., 1912, lxx, 333.

20. Plotz: The Etiology of Typhus Fever (and of Brill's Disease); Preliminary Communication, The Journal A. M. A., 1914, lxii, 1556.

21. Arzt und Kerl: Ueber den Typhus exanthematicus, Arch. f. Derm. u. Syph., Orig., 1913, cxviii, 387.

tures were diagnosed before a week of incubation; in only two instances did any of the flasks contain any growth and these were obviously contaminations. The cultures were made as a control of our work on transmission, but the results are independently important in that they show the difficulty in the cultivation of the typhus bacteria. To my mind they cast some doubt on the results of those experimenters who have reported the cultivation of bacteria on these ordinary media.

Our observation of bipolar organisms in the blood was later confirmed by Gavino and Girard,[22] by Nicolle[1] and by Hegler and von Prowazek.[10] I[23] have since reexamined the blood preparations made during our earlier study and feel quite certain that our findings are as significant as we then thought them to be. In reply to the criticism of Nicolle and others that these organisms are present in the blood in too small numbers to be accepted as the cause of the disease, I would call attention to the scarcity of bacilli in the blood of typhoid patients (*Typhus abdominalis*) and the difficulty in finding diplococci in the blood of pneumonics.

Following the publication of our observations appeared researches by Wilson[24] who cultivated a diplococcus in fifteen of thirty-three cases, and the investigations of McCambell[17] who observed organisms in the blood which gave the impression of being diplococci, but on closer study were shown to be bacilli with polar staining. McCambell made cultures on a variety of media, but all were negative.

In 1910 also appeared the publications of Predjetschensky[18] who observed in blood, urine and sputum an organism, usually rod-like, at times a diplobacillus, Gram-negative, non-motile, polar-staining. Cultures were positive in 100 cases when made between the sixth and ninth day of the disease, 2 to 5 c.c. of blood being implanted in 200 c.c. of broth, growth visible after twenty-four or forty-eight hours. The organism proved pathogenic for mice and guinea-pigs, was agglutinated by typhus serum but only in strong dilutions, 1:10 in one hour and 1:40 in four hours. Other immunologic tests are not reported, nor is there any proof that the animals for which the germs proved toxic had developed actual typhus fever.

Silberberg[25] in 1912 found in the cerebrospinal fluid a micrococcus which showed a clear middle zone, and Fürth[19] in 1912 described in the blood a short, thick bacillus with a clear central zone which proved cultivable in 38 per cent. of cases. The growth was difficult and polymorphous tendencies were exhibited on artificial media. Agglutination with typhus serum was indefinite and only a slight pathogenicity was found for apes, guinea-pigs and rats.

In 1913 Müller obtained cultures of a diplobacillus in five of eleven cases of typhus. The organism was Gram-positive at first, subcultures Gram-negative, slightly toxic for mice but non-toxic for macacus monkeys. He believes it the same organism as that described by Fürth, Rabinowitsch and Predjetschensky.

Finally and to my mind most encouraging, is the recent report of Plotz.[20] Plotz made anaerobic cultures of typhus blood, which in my opinion was a wise procedure, and, although his methods are not described in the preliminary report, he seems to have succeeded in obtaining eleven positive cultures in twelve cases of typhus fever, six of these being the milder Brill's disease. The cultures when injected into guinea-pigs produced a febrile reaction similar to that which occurs after inoculation of typhus blood. Complement deviation was obtained in six of eight cases, using an antigen made from the bacillus and serum from patients after crisis. The morphologic description is as follows:

> The organism is a small Gram-positive pleomorphic bacillus from 0.9 to 1.93 microns in length, the breadth being from one-fifth to three-fifths the length. It is non acid-fast, has no capsule or polar bodies and can be demonstrated with appropriate methods.

This description agrees rather closely with that of the structures observed in typhus blood by Ricketts and myself and with the observations of several of the more recent investigators. It would seem that many of us have been interested in the same organism. If later work bears out these earlier studies, typhus fever must be included in the group of insect-borne bacterial diseases and grouped together with plague and Rocky Mountain spotted fever. It is worthy of note that both of these diseases are caused by bipolar bacilli that resemble the organism probably responsible for typhus. This close relationship of typhus with plague and Rocky Mountain spotted fever was suspected by Ricketts some time before our investigations of typhus were undertaken.

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22. Gavino and Girard: Nota preliminar sobre el Tifo experimental en los Monos inferiores, etc., Publ. del Institut Bacter. Nacional de Mexico, 1910.
23. Wilder: The Problems of Transmission in Typhus Fever, Jour. Infect. Dis., 1911, ix, 11.
24. Wilson: The Etiology of Typhus Fever, Jour. Hyg., 1910, x, 155.
25. Silberberg: Bakteriologische Untersuchung der Zerebrospinalfluessigkeit bei Typhus exanthematicus, Ref. Centralbl. f. Bakteriol., 1912, liii, 327.

STUDIES CONCERNING DIABETES*

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The work, of which this paper will give a synopsis, is the continuation of an experimental study of diabetes described in detail elsewhere.[1] Certain of the results of the previous investigation, bearing on the present topic, may be summarized under the following four headings:

1. Production of Diabetes: Removal of portions of the dog's pancreas produces a lowering of the sugar tolerance. Removal of nine-tenths of the gland results in severe diabetes. When the remnant is larger (for instance, one-eighth), milder types of diabetes result. The course is chronic, extending over months, and the end fatal. Such animals furnish a closer imitation of human diabetes than is produced by total pancreatectomy.

2. Pathologic Anatomy of Diabetes: In the foregoing procedure, duct communication between the pancreatic remnant and the duodenum is preserved. Therefore the acinar tissue does not atrophy, and in some cases it may hypertrophy. The islands of Langerhans show typical progressive alterations, which may be summarized as vacuolation of cytoplasm and loss of granulation, pyknosis of nuclei, loss of cells, and

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1. Allen, Frederick M.: Studies Concerning Glycosuria and Diabetes, Harvard University Press, Cambridge, Mass., 1913.

finally disappearance of islands. By suitable controls the changes were shown to be specific to diabetes. Homans[2] has made a careful histologic study of such changes in the islands of diabetic cats by the aid of the admirable methods of Bensley.

3. Pathologic Physiology of Diabetes: An idea has long existed that the disturbance of carbohydrate metabolism in diabetes might perhaps be explained by the assumption that sugar exists in a combined form in the normal body, but that this combination is lacking in diabetes. In the diuretic behavior of dextrose in diabetic and non-diabetic animals, I found contrasts which were interpreted as evidence in favor of this conception, which was therefore put forward as a hypothesis to explain the various phenomena of diabetes. The combining substance was designated by the figurative title of "amboceptor," to indicate its function as a bond between tissue and sugar. The substance which thus combines with dextrose, or some link in the combination, is supposed to be furnished by the islands of Langerhans. For details concerning the hypothesis and the evidence, reference must be made to the original publication.

4. Prevention or Checking of Diabetes: Under certain conditions the presence or absence of experimental diabetes may be determined by the patency of the pancreatic duct. When the pancreatic remnant is sufficiently small, diabetes results, even if this remnant is cut off from duct communication. But, with a slightly greater size of pancreas-remnant, it is possible under favorable conditions in certain cases to show that diabetes occurs if the duct is patent, but remains absent if the duct is ligated. Particularly in one instance it was shown that a diabetes already begun stopped when the duct was ligated. The period during which diabetes can thus be prevented is necessarily limited, since ligation of the duct produces in the dog gradual atrophy and degeneration of all the elements of the pancreas, and this gives rise after weeks or months to the Sandmeyer type of diabetes.

PRESENT INVESTIGATION

The present research has advanced along the same lines as the preceding one, and has kept in view the same clinical purpose.

I. PRODUCTION OF EXPERIMENTAL DIABETES

A. By Operation

Of several species of animals tried, the dog and cat are the most convenient and useful. Rapid death from cachexia, which I previously described as an occasional occurrence in dogs, is more frequent in cats. In them diabetes is intense and life short after removal of nine-tenths of the pancreas; but by removal of fractions such as three-fourths, four-fifths and five-sixths of the pancreas, one obtains mild or severe forms of diabetes as desired, and such cats live for weeks or months. In cats, more readily than in dogs, can thus be produced mild, transitory, intermittent forms of glycosuria, doing the animal little or no harm, and determined largely by diet (as milk, or sometimes even the feeding of liver instead of ordinary meat). There is a decided tendency toward recovery, though aggravation can often be produced by continuance of improper diet. This form of diabetes may be compared to those mild, intermittent, relatively benign human cases which some persons have supposed to be not of pancreatic origin.

With respect to dogs, the figures given above concerning size of pancreas-remnants hold good for medium-sized animals, such as were convenient for the purposes of the previous research. Present findings indicate that the size of the pancreas in proportion to body-weight in large and small dogs may vary considerably, and that the size of the pancreas-remnant which permits diabetes may vary correspondingly, though a longer series of observations must be completed before making more precise statements. In cats variations of this character are absent or less marked.

B. By Diet

The papers of Thiroloix and Jacob, previously reviewed, report success in a line of experiment in which earlier workers failed. They state that some dogs after partial pancreatectomy are free from glycosuria on meat diet, but show glycosuria when carbohydrate is fed; and that continuance of carbohydrate diet finally brings the animals into a state of severe diabetes in which they excrete sugar even on meat diet. The reports of the French authors are brief, and contain no mention of controls or proof that such dogs might not ultimately develop severe diabetes, even without carbohydrate feeding. These may perhaps be the reasons why this discovery has received practically no notice in the literature. Independently of these writers I had made similar observations, and believing them to be of importance, I have repeated and extended the work. Based on the experiments so far conducted, it is possible to make the following statements:

1. After removal of sufficiently large fractions of the pancreas, as above described, dogs develop a severe diabetes, in which they show heavy glycosuria on meat diet and also during considerable periods of fasting. The condition progresses steadily downward to a fatal end.

2. When the remnant of pancreas left *in situ* is slightly larger, a condition may be produced in which the fate depends on the diet. On meat feeding such a dog is free from glycosuria and remains so for months, eating his fill every day and maintaining full health and nutrition, with no sign of downward progress; but subcutaneous tests show that the dextrose tolerance is very low, and bread feeding readily produces glycosuria. A return to meat diet stops the glycosuria; but if the bread diet and accompanying glycosuria are maintained for too long a time, the glycosuria then continues, even on meat feeding. The diabetes thus produced is not inferior in severity to that resulting from simple removal of larger fractions of pancreatic tissue, and the downward course and fatal termination are similar.

3. When the pancreas-remnant is still larger, glycosuria is absent on meat diet, and on bread diet may be absent or transitory. Such animals may remain in excellent condition indefinitely on bread diet, free from glycosuria or any downward tendency; but if sufficient sugar is added to the diet, glycosuria can be produced and maintained. After a period of such glycosuria, the animal reaches a condition in which it is glycosuric on bread diet. By prolonging the glycosuria on bread diet, the dog finally reaches the condition of severe diabetes, with glycosuria on meat diet, and continuous downward progress. For such sugar feeding I have ordinarily used commercial glucose. The

2. Homans, John: Jour. Med. Research, 1914, xxx, 49.

experiments succeed best in greedy dogs and those naturally fond of sugar. A decided aversion to sugar on the part of the dog may spoil such an attempt through failure of appetite.

4. When the pancreas-remnant is still larger, sugar feeding may produce transitory glycosuria, but it cannot be made to continue. The sugar tolerance is lower than in normal dogs, but nevertheless the doses of sugar necessary to produce glycosuria are higher than can be tolerated as a daily routine by the gastro-intestinal canal. Persistence in the attempt to maintain glycosuria causes diarrhea and illness. The dog refuses to eat, sugar given by stomach-tube is vomited, and true diabetes remains absent. Similar results can be obtained with cats by feeding carbohydrate in the form of milk.

The changes previously described as occurring in the islands of Langerhans occur whether the diabetes follows directly on the operation alone, or has been induced in the prepared animal by means of modification of diet. The best of the control animals are still alive; but the control tissues thus far examined indicate that in animals predisposed by operation, when diabetes is prevented by carbohydrate-free diet, the signs of exhaustion and degeneration in the islands of Langerhans are absent. If further study shows that this is the case, it will afford additional evidence that these changes have a direct relation to the diabetes and that they are a result of functional overstrain.

While various factors are undoubtedly concerned in the production of human diabetes, clinical observations indicate that diet is an important one. It is generally recognized that there is a higher incidence of diabetes among those races or classes of people who use an excess of carbohydrate. Luxurious living and sedentary life are thought to predispose to this disorder. The experimental observations on animals suggest an explanation of this relationship between diet and diabetes in the human subject. If individuals differ in the strength of the pancreatic function as in other functions, in some this may be so weak that diabetes comes on in early life irrespective of the diet. In others this function may be only a little stronger, so that diabetes may be delayed until later in life or even to the period of senility, when there occurs an impairment of various functions. Others may be more or less below the average in pancreatic functional power, but under ordinary circumstances this is sufficient to prevent the occurrence of diabetes. In these persons, however, who might otherwise go through life with no sign of diabetes, an excess of starch in the diet may serve as an exciting cause of diabetes, and the degree of such excess may help to determine the earlier or later onset and the milder or severer type of the disorder. In other persons of this sort, as in the corresponding type of dogs, the pancreatic function is able to deal safely with as much starch as can be digested, but a sufficient excess of sugar is an effectual cause of diabetes.

It is impossible to produce diabetes in the normal dog by an excess of carbohydrate feeding, since if too much sweet or starchy food is taken, indigestion results and automatically stops the ingestion. But in dogs after operation and in predisposed human patients, pancreatic weakness may reverse the normal relation, so that the organism can digest and absorb more carbohydrate than it can combine and assimilate; and in this condition the production of diabetes by improper diet is possible. The question of diabetes may then be regarded as a balance between the digestive and assimilative functions. Moreover, the body is equipped with no natural safeguards against this unnatural condition. There is no reflex or other mechanism which points plainly to the cause of the trouble and compels its cessation. On the contrary, the impaired nutrition due to failure of assimilation affects the organism as if it were due to deprivation of food. The response commonly shows itself in the harmful form of increased appetite. The taking of excessive food injures the assimilation still further, and thus a vicious circle results.

II. PREVENTION OR CHECKING OF EXPERIMENTAL DIABETES

The therapeutic experiments in animals pertain to two groups of cases, those in which diabetes is produced by simple operation, and those in which diabetes is produced by diet in predisposed animals.

1. Animals made diabetic by operation. In animals from which an excessive amount of pancreatic tissue is removed, a diabetes may be obtained which is so severe that fasting will not produce sugar-freedom. But when the pancreas remnant is of suitable size, for example, one-tenth, though the resulting diabetes is permanent on meat diet and will end fatally if allowed to persist, nevertheless a few days of fasting at the outset will produce sugar-freedom. If the diabetes is allowed to continue longer, a much longer period of fasting may be necessary for sugar-freedom, or it may be impossible to obtain. If, after obtaining sugar-freedom, feeding of protein and fat (with occasional bones) is begun very cautiously, in quantity only enough to maintain the animal in its thin condition, such dogs remain free from diabetes. The longest experiment to date is that of a dog which, possessing less than one-tenth of the pancreas, has been kept free from diabetes for six months, and there is at present no indication that the condition cannot be continued indefinitely. If an attempt is made to increase the weight of such an animal, glycosuria soon appears and must be checked by renewed fasting. Such dogs, though very thin, are vigorous and lively. They contrast sharply with dogs which, after similar operations, are allowed to remain diabetic on full meat diet. Though the latter animals at first appear much better nourished, they finally emaciate in spite of the most enormous eating; and when they have become as thin as the dogs above described, weakness and cachexia are very evident, and the progress continues downward to death.

2. Animals made diabetic by diet. When the animal possesses perhaps an eighth or a sixth of the pancreas, and is not diabetic after operation but is then made diabetic by excess of carbohydrate, this diabetes at first can be stopped by a simple change to meat diet. After a longer duration, the diabetes no longer stops on carbohydrate-free diet; but after a period of fasting, the time depending on the severity of the diabetes, the urine becomes sugar-free. With still greater duration or severity of the diabetes, sugar-freedom is no longer obtainable by fasting. When such animals are made sugar-free, they may be kept so by the same procedure as described for those of the former group. When the diabetes is thus checked fairly early, it is evident that the prognosis is much more favorable than in animals of the previous group, for in the present animals the removal of pancreatic tissue was considerably less, and the cause of the diabetes is partly a functional change. Accordingly, it is found that the

diet can be gradually increased, and in favorable cases the animals be brought to a higher level of weight and nutrition than is ever possible with dogs of the preceding type. Up to the present, however, the experience has been that these dogs are never able to return quite to the condition which they enjoyed before the diabetes, and which is permanently maintained by similar dogs in which diabetes is prevented by suitably chosen diet from the outset. As above mentioned, dogs so treated can be kept indefinitely at full weight and well-being when placed after operation on a diet which keeps them free from glycosuria. But when diabetes gravis has been produced and allowed to continue long enough to demonstrate its reality, while it has been possible by the foregoing method to stop the diabetes and bring a dog back to within a kilogram of its normal weight, every attempt to produce a further gain in weight has brought a return of glycosuria, which must be checked by fasting. Such dogs, however, are so near to normal that, if they are mixed up in a yard with ordinary dogs, a stranger might be unable to tell one from the other.

The microscopic examinations of the pancreas remnants of such animals as have yet come to necropsy from both of these groups show that in both alike the island cells are well endowed with cytoplasm and granules, and degenerative processes are not seen; but there is a decided impression that the islands are inferior in both size and number to those of normal animals. If this impression proves valid in further experiments, a correlation readily suggests itself between the observed anatomic change and the diminished pancreatic function described in the preceding paragraph.

In my previous report I have shown that by removal of suitable fractions of the pancreas, animals may be brought so close to the verge of diabetes that the removal of less than a gram of additional pancreatic tissue suffices to bring on diabetes. According to the "amboceptor" hypothesis, the pancreas furnishes some definite substance or substances used by the cells of the body for the metabolism of carbohydrates and perhaps also of other foods, the "amboceptor" being used up in metabolism and bearing some quantitative relationship to the metabolism. Extending this theory to the foregoing experiment, one may say that the fragment of pancreas which barely prevents diabetes is the smallest fragment which can supply the minimum quantity of "amboceptor" necessary for the animal's metabolism. When such a pancreatic fragment is even slightly reduced, the supply becomes slightly deficient in quantity, and diabetes accordingly begins and runs the usual downward course.

Present observations prove that the reverse of this experiment is likewise possible, that is, when an animal and its food consumption are suitably reduced, a pancreatic remnant otherwise inadequate becomes adequate; diabetes under these conditions may be prevented or be checked after it has appeared. Prevention or cessation of diabetes previously observed in consequence of ligature of the pancreatic duct may be explained by the impaired food absorption and chronic malnutrition of the animal. Similarly in dogs which develop distemper after the pancreatic operation, and which therefore refuse food and emaciate rapidly, diabetes may fail to appear or may stop after it has appeared. Interpreting these experiments on the basis of the "amboceptor" hypothesis, one may say that an otherwise insufficient amount of "amboceptor" may become sufficient when the metabolism of the body is artificially diminished.

III. CLINICAL TREATMENT OF DIABETES

In the clinical literature of diabetes there are authentic reports of certain cases in which even severe diabetes has cleared up spontaneously and completely on the onset of cirrhosis of the liver, cancer, tuberculosis or some other wasting condition. Other cases have notably improved. Probably the most severe and certainly the best studied of such examples was presented by one of Joslin's patients,[3] in whom a long-standing and dangerous acidosis disappeared entirely, and a negative carbohydrate balance became positive, following the onset of tuberculosis. When these cases are considered in the light of the experimental study of animals, the possibility is suggested that we have an indication for a rational method of dealing with diabetes, or impaired pancreatic function associated with overstrain.

Notice should be taken of the advantage possessed by most diabetic human patients over diabetic dogs. Even the most hopeful of the above-described dogs has only a small fraction of the pancreas. Most of the organ is hopelessly gone, and the presence or absence of diabetes is determined by functional influences acting on the little remnant. Furthermore, even when the diabetes is inaugurated by functional means, the organic degenerative changes quickly ensue in the islands of Langerhans. Under these conditions it is surprising that results are obtainable by treatment at all. On the contrary, in typical human diabetes the entire pancreas is present, and there are indications that functional disturbance is an important factor.

It has been thought justifiable, therefore, to undertake the treatment of a limited number of patients by a method based on the principles derived from the experimental work as indicated in this communication. The number of patients so far treated is limited, but the results obtained indicate that the same method employed in rendering the diabetic dog free of glycosuria and prolonging its life is efficacious in eliminating glycosuria and acidosis in the human patient. To what extent life may be prolonged by this method only a large statistical study will show. The observations so far indicate that the method is not harmful, and when carried out carefully seems definitely beneficial.

The method of treatment is in brief as follows: If the patient is moderately emaciated, with a negative carbohydrate balance and acidosis, he is put to bed and receives no food whatever. If coma seems imminent the usual emergency treatment with purging, stimulants, alkalies and large amounts of water should, of course, be carried out. In addition to fasting, alcohol is important in the treatment at this stage. From 50 to 250 c.c. of whisky or brandy may be given in each twenty-four hours in small doses, from 10 to 20 c.c. every one to three hours during the twenty-four. As soon as the glycosuria stops and the acidosis diminishes, which even in severe cases may be within forty-eight to ninety-six hours, the amount of alcohol and alkali may be reduced. Fasting and moderate dosage of alcohol are continued for from twenty-four to forty-eight hours longer, however, depending on the patient's strength. The alkali is now stopped, and feeding with starch is commenced in order to clear

3. Benedict, Francis G. and Joslin, Elliott P.: A Study of Metabolism in Severe Diabetes, Carnegie Institution of Washington, 1912, Case R, p. 55.

up the last traces of ketonuria. The kind of starch is of minor importance. Green vegetables are useful because their carbohydrate and food value is so low that they can be given in considerable bulk, and this bulk is agreeable to the patient for relieving his feeling of emptiness. Neither fat nor protein is added. For the first day, the food is chosen to represent a carbohydrate content of from 10 to 40 gm. This is divided into four to ten equal portions and fed at equal intervals during the day. If glycosuria remains absent, the ration for the next day is doubled, to represent 20 to 80 gm. of carbohydrate, similarly divided into numerous small portions. On the next day it is sometimes possible to increase the ration to 100 gm. of carbohydrate, without glycosuria. About this time, especially if glycosuria has appeared, another fast-day is interposed, from 50 to 200 c.c. of whisky being given. Present experience indicates that even in severe cases ketonuria may by this method be made to disappear entirely. Several repetitions of the foregoing routine may be necessary for this purpose. All food contains danger, tending toward either glycosuria or ketonuria. The carbohydrate of the diet is seldom reduced below 50 gm., and is preferably kept higher. If carbohydrate must be kept low, the total diet is kept low. The diet is so chosen that glycosuria, not ketonuria, is the signal of overstrain. Fasting-alcohol days are given not merely whenever this signal appears, but also at close enough intervals to prevent it from appearing, even every two or three days if necessary. If there has been no glycosuria, a slight addition to the diet is made after each fast-day. Each day's diet is calculated exactly, and the nitrogen-balance is watched. It is thought that no matter how low the assimilative power, the attempt to feed in excess of this power is harmful, and it is possible that by rest the assimilative function may gradually become stronger. With improvement in the patient's condition, the carbohydrate in the diet is further increased. Increase in weight, however, is not attempted at this time. From our present point of view, contrary to the generally held opinions, the attempt to increase weight should be the last rather than the first step in treatment. It is attempted to keep the metabolism at the lowest safe level until the patient is taking from 100 to 150 gm. of carbohydrate (mostly as green vegetables) daily, with fast-days interposed often enough to prevent any trace of glycosuria from appearing. Then protein is cautiously added, always being kept rather low; and in favorable cases the weight and well-being may finally improve under gradual additions of fat.

The radical procedure here described is that used for the most severe cases. In milder cases the treatment may be correspondingly milder. Primary loss of weight is intentional. The purpose of the treatment is not to confer temporary comfort or appearance of well-being, though various symptoms, including polyphagia and asthenia, may actually be relieved. When there is extreme cachexia and emaciation, the difficulty is greatest. It may then be necessary to juggle very carefully the three factors of glycosuria, acidosis and nutrition.

A report giving the results of this form of treatment in a series of cases will be published later. It is felt that the conception underlying this method of treatment, based on experimental observations, is new, though certain details have long been recognized as of importance. According to this method, alkali treatment is not employed, unless for a brief period at the outset, while severe acidosis is being combated. The alkali treatment has been called the most brilliant discovery in the modern study of diabetic therapy. It is indeed a valuable means for facilitating the excretion of acetone bodies. But under an efficient treatment of diabetes, acetone bodies should not be excreted. They should be burned.

Though it seems possible thus to check all active symptoms, with apparent benefit, even in very severe cases, yet it is felt that the ultimate outlook for these patients is far less favorable than it would be if they could be treated earlier. The best therapeutic hope is believed to lie in the application of this principle of treatment at the earliest possible stage in diabetes.

ABSTRACT OF DISCUSSION

PROF. A. J. CARLSON, Chicago: Does Dr. Allen consider the evidence conclusive that mere obstruction of the pancreatic duct in dogs leads to the atrophy of all the elements in the pancreas? In the rabbit this is not the case. I have seen in dogs, in connection with other work, the islands persist for six or nine months, that is, enough of the island tissue to prevent diabetes.

DR. ALLAN C. EUSTIS, New Orleans: Has Dr. Allen noticed the appearance of the acetone bodies in the urine of these dogs; whether they were present during the fasting stages and how soon they would appear; and also whether the amount of the pancreas left in had anything to do with the rapidity with which the acetone bodies appeared?

DR. F. M. ALLEN, New York: Answering the latter question first, I have never seen a satisfactory reproduction of human acidosis in dogs. A few authors have reported considerable acidosis in totally depancreatized dogs, and even death in coma, but these cases are the exception rather than the rule. The difference between carnivorous animals and man as respects acidosis is one reason for attempting to reproduce diabetes in other species which are more like the human in this respect. With regard to Dr. Carlson's question, two factors must be considered; one is species, and the other is time. In rabbits and guinea-pigs, following ligature of the pancreatic duct, authors have proved that numerous normal-appearing islands of Langerhans are present long after the disappearance of all acinus tissue. The pancreas is described as being replaced by fibrofatty tissue and though the islands pass through phases of degeneration and regeneration, the island tissue is not permanently destroyed but apparently persists indefinitely. Such animals are free from diabetes, but it has never been proved that true diabetes can be produced in these species by any means. In dogs, on the other hand, ligature of the pancreatic duct is followed by scar-tissue formation, and islands as well as acini are destroyed. Such degeneration of a ligated pancreas-remnant gives rise to the Sandmeyer type of diabetes. In the dense fibrous tissue at the site of the pancreas in dogs dead from prolonged Sandmeyer diabetes, it is said that neither acini nor islands have been found. The time-element is involved in experiments such as Macallum's, which undertake to show that islands persist at a time when all acini have disappeared, and that the dog at this time is not diabetic. Positive results in such experiments may furnish evidence in favor of the insular hypothesis; nevertheless after a longer time-interval the islands may be expected to degenerate and disappear. Indefinite persistence of islands in the ligated pancreas, as proved for the rabbit, has never been shown in the dog.

The Eye Sees Only What it is Trained to See.—How many eyes—yes, and skilled eyes, too—looked at the thorax and never saw the so-called Litten's sign or diaphragm phenomenon? Many of us look at it every day and fail to see it, even after we know about it. How often does the diagnosis of a thoracic aneurysm go begging for want of a careful glance?—Thomas McCrae, *Canadian Med. Assn. Jour.*

THE INFLUENCE OF SWEAT BATHS ON THE NON-PROTEIN NITROGEN CONTENT OF THE BLOOD IN NEPHRITICS*

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The present study is based on the supposition that by the use of the recently acquired accurate methods for estimating the non-protein nitrogen of the blood, it might be possible to determine with greater precision than formerly the effects of sweat baths on the blood in nephritis. The sweat bath, advocated first for the removal of fluid from individuals with diseased kidneys, has more recently been extensively employed for the purpose of increasing the elimination of such solids as are normally excreted by the kidneys. Certain early observations seemed to afford a basis for such a procedure. It was found that in some nephritics, after sweating, a deposit was present on the skin which on analysis proved to be rich in urea. It was soon shown, however, that this phenomenon occurs only in agonal states or in conditions of extreme collapse when the permeability of the capillaries is quite abnormal and is in no sense comparable to that obtained under the conditions of the ordinary therapeutic sweat bath.

The chief method of approaching this problem experimentally has been by a study of the amount and composition of the sweat obtained. Both Strauss[1] and Bendix,[2] by freezing-point determination, found sweat to be of a lower concentration than the blood, from which it might be expected that sweating would lead to a greater concentration of the blood. Bendix failed, however, to demonstrate any lowering of the freezing-point of the blood after a sweat, and in one nephritic found an elevation. On the other hand, Georgopulos[3] noted in two nephritics a trifling, probably negligible, depression of the freezing-point of the blood after sweat baths. Von Noorden[4] collected the sweat during sweat baths and estimated the quantities of nitrogen and of sodium chlorid recovered, and as a result found great variations in the output by different individuals, by the same individual at different times, and from different skin areas of the same individual. From his observations he concluded, however, that a nephritic, in the course of an hour's sweat, might excrete not more than 1 gm. nitrogen or 2 gm. sodium chlorid. In a very recent study Plaggemeyer and Marshall[5] have estimated the nitrogen of the sweat obtained from fifteen normal individuals during a hot air bath lasting for twenty-five minutes after the onset of sweating. They found outputs of nitrogen ranging from 34 to 640 mg. The amount of nitrogen per hundred gm. of sweat ranged from 67 to 194 mg., a concentration much above the normal non-protein nitrogen concentration of the blood, and higher than that of most nephritics. Their study would apparently suggest the possibility of reducing the non-protein nitrogen concentration of the blood by such procedures.

Loofs,[6] and later Tachau,[7] studying the output of nitrogen and chlorids throughout the entire twenty-four hours in the sweat of non-nephritic as compared with nephritic individuals, reached different conclusions: the former finding a similar output in the two classes whereas the latter obtained, on the average, a slightly higher output in the nephritics, and a much higher output in one case of contracted kidney secondary to chronic lead poisoning.

Thus we see that hitherto the study of the value of sweating, in its influence on the nitrogen content of the blood, has been attacked chiefly by the estimation of the composition of the sweat itself. We feel, however, that, in the recently developed technic of Folin and Denis, we have at hand a means of attacking this problem more directly, in that it is possible to determine the composition of the blood itself, as regards its nitrogen content, before and after sweating. For this purpose we have made use of eleven patients of the type that customarily receives sweat baths for therapeutic purposes.

EFFECT OF SWEAT BATHS ON TOTAL UNCOAGULABLE NITROGEN OF THE BLOOD OF NEPHRITICS

Name	Sys. Bl. Pr.	Phthalein Test*	Nitrogen† Before Bath	Nitrogen† Immediately after Bath	Nitrogen† 1-4 Hrs. after Bath
Li	160	30	32	..	33
Sh.	145	30	33	..	30
Sn.	195	35	33	..	36
Hi.	140	35	36	..	31
Th.	180	40	37	..	39
Fa.	170	25	46	47	48
Wi.	260	45	54	..	60
Wi.	...	10	50	48	..
Pe.	150	..	59	55	..
Ra.	230	20	81	79	..
Re.	210	10	96	98	..
Du.	90	..	106	107	..

* Figures indicate percentage eliminated in two hours.
† Figures indicate milligrams of total uncoagulable nitrogen per hundred c.c. of blood.

TECHNIC

Each patient was given a sweat bath lasting from twenty to thirty minutes, during which he was made to sweat profusely, and was given at the same time all the water desired by mouth. When the patient was able to be up an electric cabinet bath was employed, but when confined to bed an ordinary vapor bath was used. The blood was taken from a vein at the elbow before and after the bath, 5 c.c. being used for each estimation.

The technic used for the determination of the total incoagulable nitrogen has been that of Folin and Denis, except that we have collected the ammonia in the final stage in fiftieth-normal hydrochloric acid and titrated with fiftieth-normal sodium hydroxid instead of nesslerizing. We have found titration to be as accurate and more simple and less time-consuming than nesslerization for the estimation of total nitrogen. Duplicate analyses were made, except in a few

* Read before the Section on Pharmacology and Therapeutics at the Sixty-Fifth Annual Session of the American Medical Association, Atlantic City, N. J., June, 1914.

* From the John Herr Musser Department of Research Medicine, University of Pennsylvania.

* These studies were made on patients on the Service of Dr. Alfred Stengel, Hospital of the University of Pennsylvania.

1. Strauss: Ueber Nierenentlastung durch Schwitzen, Deutsch. med. Wchnschr., 1904, xxx, 1082.
2. Bendix, E.: Ueber Wechselbeziehungen zwischen Haut- und Nierentätigkeit, Deutsch. med. Wchnschr., 1904, xxx, 233.
3. Georgopulos, M.: Anregung der Diaphorese bei Niereninsufficienz, Deutsch. med. Wchnschr., 1908, xxxiv, 372.
4. Von Noorden, C.: Handb. d. Path. des Stoffwechsels, 1906, i, 1048.
5. Plaggemeyer, H. W., and Marshall, Jr., E. K.: A Comparison of the Excretory Power of the Skin with that of the Kidney Through a Study of Human Sweat, Arch. Int. Med., January, 1914, p. 159.
6. Loofs, F. O. A.: Welche Mengen von Stickstoff und Kochsalz werden durch die Haut von Nierenkranken ausgeschieden, Deutsch. Arch. f. klin. Med., 1911, ciii, 563.
7. Tachau, P.: Untersuchungen über den Stickstoff- und Kochsalzgehalt des Schweisses von Nierenkranken, Deutsch. Arch. f. klin. Med., 1912, cvii, 305.

instances; the greatest difference permitted being 0.1 c.c. of fiftieth-normal sodium hydroxid. Usually the titrations were identical or varied by only 1/20 c.c. fiftieth-normal sodium hydroxid.

With one exception our cases are all instances of chronic arterial hypertension; in some the phenolsulphonephthalein output was low and there was a moderate or marked increase of the incoagulable nitrogen of the blood; in the others, however, the phenolsulphonephthalein output was normal or nearly so and there was little if any nitrogen retention.

The last case is of especial interest, being an instance of acute mercuric chlorid poisoning with suicidal intent. The patient developed total anuria within twelve hours of the taking of the poison, and this had persisted until the time when our analyses were made, thirty-six hours later. In his vapor bath this patient sweated very freely.

The blood was in all cases taken immediately before the bath, and the second sample in some cases immediately after the bath, in other cases from one to four hours after the bath. Our results are shown in the table and may be summed up in the statement that no change of significance was observed in the concentration of the non-protein nitrogen of the blood as the result of the sweat bath.

In conclusion therefore, without any intention of denying a possible therapeutic value from sweat baths, we find no evidence that they lead to any significant change in the concentration of the non-protein nitrogen of the blood.

THE USE OF ATOPHAN AND RADIUM EMANATION IN THE TREATMENT OF GOUT AND THE ARTHRITIDES *

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AND

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NEW YORK

Medicine has long awaited a therapeutic agent which would induce a significant increase in the output of uric acid. Before the introduction of atophan, aside from the salicylates, there was no drug which could be relied on to bring about this condition. During the six years of its history, abundant data have accumulated demonstrating that atophan may increase the elimination of endogenous uric acid from 50 to 200 per cent., and the mechanism by which atophan acts has been the object of much investigation. Disregarding the several views held concerning this point, we may say that at present the simplest and most satisfactory explanation is to be sought in an increased permeability of the kidneys, by which the level of uric acid retention is lowered, thus permitting a draining of this substance from the blood and tissues. While there are occasional scattered data in the earlier literature on atophan which appear to favor this view, nevertheless the idea may be said to have received its first experimental support when Folin and Lyman,[1] by means of the Folin-Macallum colorimetric method, demonstrated an unquestionable decrease in the uric acid concentration of the blood associated with the augmented output in the urine. These observations have since been confirmed by McLester,[2] Steinitz[3] and ourselves.[4]

Whatever may be its cause, gout is undeniably characterized by a concentration of blood uric acid which is from two to five times as great as that observed in normal individuals. Whereas, in the majority of normal individuals one finds 1 to 2.5 mg. uric acid per hundred grams of blood, in gout it is in general as high as 4 to 6 mg. Since the principle of treatment in gout is to avoid purin foods and to maintain the uric acid of the body tissues as low as possible, it would seem that an agent which is essentially a specific eliminant for uric acid, as atophan appears to be, would form a rational therapy in this condition. It then becomes desirable to learn the details attending the action of this drug.[5] We have found that the action of atophan on the blood uric acid begins to make itself felt within two or three hours after its administration, that is, as soon as absorption has taken place, and reduces the blood uric acid to a minimum concentration within about two days. This minimum concentration appears to vary for different individuals from 0.7 to 2.5 mg. per hundred grams of blood and cannot be further lowered even when the drug is administered continuously for a month and a half. The original level of uric acid concentration is nearly reattained after the use of the drug has ceased for two days.

Under treatment with atophan, all of the five cases of gout showed improvement of more or less permanence, as did also four cases of possibly gouty nature. Of the eleven cases of arthritis of various types, two showed some improvement. A superficial summary of clinical results of this character cannot, however, convey an adequate view concerning the value of the treatment. Thus, in one case of gout, there was almost immediate improvement after taking atophan, which persisted even after the cessation of the use of the drug, and in spite of the return of the uric acid concentration of the blood to the original level; while in another case of gout, the initial improvement became less pronounced in spite of the continued use of atophan and the maintaining of the blood uric acid at less than half its original level. We shall reserve a more careful analysis of the clinical results until we have had an opportunity to extend our observations over a longer period of time.

In contradistinction to gout, arthritis is not characterized by an excessive concentration of uric acid in the blood; and this difference, in our experience, has been of aid in distinguishing between these conditions. Thus in one case, which by several clinicians was regarded as typical gout, there was a constant uric acid concentration of but 2 mg. per hundred grams of blood. A careful investigation disclosed a colon bacillus infection in the pelvis of the kidney, which was cleared up under the administration of the appropriate vaccine, whereupon all "gouty" symptoms disappeared. We are not yet prepared to assert that a high concentration of uric acid is essential for a

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* Read before the Section on Practice of Medicine at the Sixty-Fifth Annual Session of the American Medical Association, Atlantic City, N. J., June, 1914.

* From the Department of Medicine and the Laboratory of Pathological Chemistry, New York Post-Graduate Medical School and Hospital.

1. Folin and Lyman: Jour. Pharm. and Exper. Therap., 1913, iv, 537.

2. McLester, James S.: Studies on Uric Acid of Blood and Urine, with Special Reference to the Influence of Atophan, Arch. Int. Med., December, 1913, p. 739.

3. Steinitz: Ztschr. f. physiol. Chem., 1914, xc, 108; Deutsch. med. Wchnschr., 1914, xl, 953.

4. Fine and Chace: Proc. Soc. Exper. Biol. and Med., 1914, xi, 111.

5. For further details see Fine and Chace: Jour. Pharm. and Exper. Therap., 1914.

diagnosis of gout, but our experience with those cases of joint and muscle involvement associated with a uric acid concentration of less than 2.5 mg. has indicated the desirability of a diligent search for foci of infection in various parts of the body, which may be the primary cause of the joint affections.

The improvement noted in certain cases of arthritis can hardly be explained by an influence on the elimination of uric acid. The usual lowering of the uric acid concentration of the blood is indeed noted, but there is no reason to regard uric acid as a factor in the etiology or progress of arthritis. In such cases there appears to be an analgesic action, which may likewise to some extent account for the relief felt by gouty individuals.

With regard to the influence of radium emanation on uric acid metabolism, various European workers have emphasized essentially two points: the increased elimination in the urine and the reduction or disappearance of uric acid of the blood. The increased elimination of uric acid in the urine under the influence of radium emanation is perhaps due to the induced leukocytosis with subsequent leukolysis. In the light of recent developments in purin metabolism, the disappearance of uric acid from the blood as noted by Gudzent[6] is a most unusual observation. It has not been supported by beaker experiments or by our own studies.

We have thus far treated thirteen cases of gout and arthritis in an emanatorium with radium emanation of 0.5 to 150 Mache units per liter of air in one- to two-hour sittings for one to two months; two cases of arthritis with radium drinking-water; and five cases of arthritis with injections of radium bromid equivalent to 50 to 100 micrograms of the element. In no instance was there any change whatever in the uric acid concentration of the blood. In view of these findings we can hardly subscribe to Gudzent's claim that with concentrations of radium emanation of as little as 2 to 4 Mache units per liter, uric acid disappeared from the blood and remained absent as long as one year.

With regard to clinical effects, we may say that in only two instances—those in which radium solutions were injected—did there appear to be any improvement. Here again, however, we feel that the treatment should be extended over a greater interval, before conclusions can be properly drawn with regard to clinical results.

393 West End Avenue—135 East Sixty-Third Street.

ABSTRACT OF DISCUSSION

DR. CHARLES G. STOCKTON, Buffalo, N. Y.: With reference to the effect of atophan in relieving the uric acid burden of the blood we have given the drug in studies of the blood, including the method of Folin. The drug has acter unpleasantly in some instances, although usually it occasioned no trouble. One other question is what is commonly meant by the term gout. Dr. Chace spoke as though gout was a condition parallel to excess of uric acid in the blood, or uricacidemia. Gout is something in addition to an excess of uric acid in the blood. Just what that something is remains to be seen. In one case coming to my attention the patient had 25 mm. of uric acid in 100 c.c. of blood when not treated, but after long-continued dietetic treatment and the use of atophan he was discharged with 8 mm. of uric acid to 100 c.c. of blood, and yet he had no gout. He had had an attack of gout ten years before. At the same time I had two cases of gout under treatment, one patient having 5 and the other 7 mm. of uric acid to 100 c.c. of blood; one was treated by atophan and the other by colchicum and both by alkalies; the results were compared. I saw but little difference, save that the atophan seemed to have rather the better effect in reducing the uric acid. The clinical course of the two cases was much alike, both having been severe and typical gout.

DR. S. SOLIS COHEN, Philadelphia: For a number of years I have been making use of atophan and novatophan in the treatment of chronic gout. I agree with Dr. Stockton that uric acid is not by any means the whole story in gout, nor do clinical results always run parallel with the reduction of the uric acid content of the blood whether under the administration of atophan or the use of radium emanations. The most striking effect, clinically, of atophan in gout, rheumatoid arthritis and acute articular rheumatism is the relief of pain. In rheumatic fever the administration of atophan was always accompanied by relief of pain and fall in the temperature, but its withdrawal was followed by a recrudescence of pain and fever. It did not bring about recovery. For this, resort to salicylates was necessary. In cases of chronic gout, or in patients having a distinct gouty tendency, atophan given for one week in the month over a period of several months is helpful. Large doses are not needed, 1 gm. a day (divided into three 5-grain doses) is sufficient. It is not necessary to reduce the uric acid content of the blood to a theoretically normal standard. Gouty people have a higher normal uric acid index than others. It is only when this is exceeded that symptoms result. This is a natural consequence of evolutionary adaptation affecting every cell in the body. While 7 mg. or even 4 mg. per hundred cubic centimeters of blood is excessive for a normal man, it may not be equally excessive for one of gouty heredity. When the quantity of uric acid has been reduced to the equilibrium-point for the individual one should be satisfied; one does not hope to make the gouty cells of an entire body normal. With radium emanations I have had some experience and also with radium drinking-water but I have not sufficient data as yet for positive conclusions. In my dispensary service at Jefferson Hospital my assistants have made careful clinical observations which seem to show that better results can be obtained in the acute cases than in the chronic ones. It is possible that the remedy was not used long enough or strong enough. Our solution equals 50,000 Mache units per liter. The first effect of the radium treatment in cases of painful joints whether of gouty, rheumatic, or other origin, is to increase the pain, that is, providing one gets any effect at all. Unless one gets this exacerbation my observations have been that one cannot hope for a curative result. Apparently the agent acts on a sluggish local process, and reawakens the corrective reactions.

DR. ARTHUR F. CHACE, New York: In reply to Dr. Stockton, we have found that those patients having an intolerance for atophan can take it, well diluted with water, in small doses or in combination with soda. Novatophan has not proved as efficient as atophan. The determination of the uric acid content of the blood will aid in more accurately diagnosticating cases of gout. We do not call a case gout unless there is a concentration of uric acid of 4 mg. per hundred cubic centimeters of blood. It is interesting to note in other conditions the high uric acid content of the blood; for example, in uremia we have found a concentration of 14 mg. uric acid to 100 c.c. of blood. The amount of the uric acid content of the blood is an index of the severity of the case. In all clinical cases of gout in which there is a low uric acid concentration it is well to look for a possible focus of infection. With regard to the method of administration, it is wise to do as Dr. Cohen suggested, give the drug for one week in one month, or else alternate giving atophan for four days and allowing an interval of four days. In all cases the patients are placed on a purin-free diet. With purin-free and alcohol-free diet and without the use of drugs we have seen the uric acid content reduced from 6 to 3 mg. per hundred cubic centimeters of blood. With regard to the clinical influence of radium, we prefer to reserve our judgment until we have had an opportunity to extend our observations.

6. Gudzent: Berl. klin. Wchnschr., 1911, xlviii, 2098.

New Instruments and Suggestions

THE SLOANE HOSPITAL INCUBATOR

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To the different varieties of incubators which have been in use for many years there have been three common objections: insufficient air space; insufficient circulation of air, and difficulty in maintenance of a constant temperature.

Impressed with these objections I have sought to overcome them:

1. By having the incubator built several times larger than those in common use.

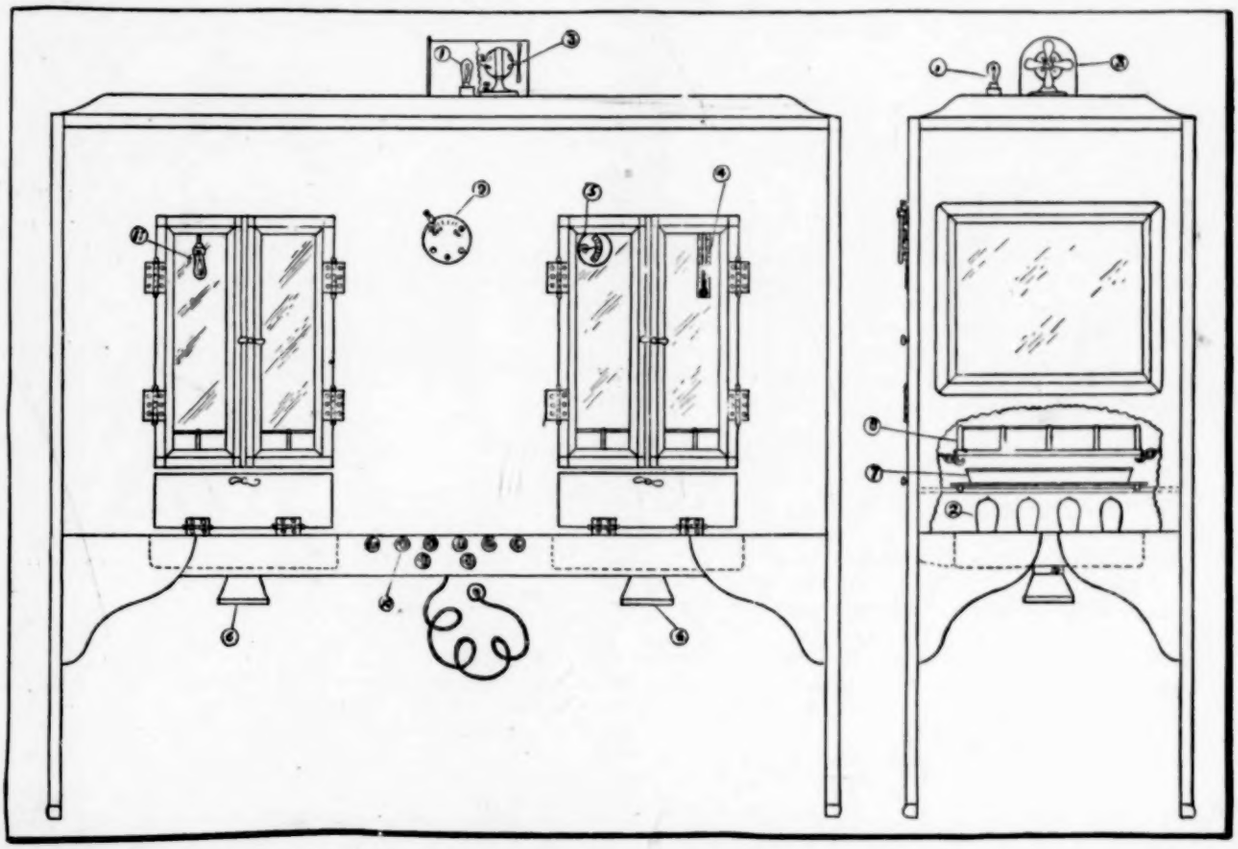
2. By maintaining a gentle current of filtered air passing through it. The air enters through a gauze screened opening below and is sucked out by a small electric fan above.

3. By maintaining a constant temperature by different series of electric lights which may be turned on or off in series.

This incubator, which was built for me by the Hospital Supply Company of New York, and of whose hearty cooperation I wish to express my appreciation, has now been in use with two of its fellows at the Sloane Hospital for Women for one year. It has met its requirements well; has demonstrated its superiority over the old types of incubators with small chambers heated by a water tank to which a gas burner was applied, and in the growth and development of the premature babies kept therein has proved a most valuable addition to the hospital.

The mechanical description of the incubator is as follows:

It is built entirely of steel finished on the outside in aluminum bronze and painted on the inside with gray enamel. It consists primarily of the incubator proper which is 84½ inches in length, 46½ inches in height, and 30½ inches in depth. It is supported on legs 30 inches high, making the total height 76½ inches. In front at each side are two double doors of beveled plate glass set in nickel-plated brass frames. At each end is a beveled plate-glass window 24½ inches by 20½ inches. In the interior directly behind each set of doors is a basket or cradle, built of nickel-plated brass wire and supported on hooks, in which the infant lies. Beneath each cradle is a tray which contains water for keeping the air moist. The condition of the air is indicated by a hygrometer and its temperature by a thermometer, both of which are visible through the glass doors. Beneath each tray is a series of violet-colored incandescent lamps which furnish the heat which is distributed by means of a heat disbursor. On the roof of the incubator a small motor with a fan and the necessary resistance is enclosed in a metal chimney leading from the interior. The motor is controlled by a rheostat situated outside of the incubator between the two front windows. The lamps are connected in series of two on each side controlled by snap switches (as shown in the illustration) which in turn are connected with the house current. Directly inside of each door is a small pilot lamp. When the incubator is in operation the air enters through the intakes,



Infant incubator; 1, resistance lamp; 2, heating lamps (violet); 3, motor for exhausting air; 4, thermometer; 5, hygrometer; 6, air intakes; 7, humidity tray; 8 cradle; 9, motor regulator; 10, heating lamp switches; 11, pilot light.

comes in contact with the heat-disbursing plates and passes throughout the interior. By means of the motor fan a continual gentle current of fresh warm air is kept circulating through the incubator. The degree of heat is regulated by turning on more or less of the snap switches and by proper regulation of the motor.

Feeding Humans According to Formulae.—The study of human nutrition has not yet produced a simple formula for man's guidance in the selection of his food. Such formulae have been successfully used in the feeding of rats, and the skilful stockman in his feeding operations carefully follows charts and rules provided him by experts on animal nutrition. We may expect that similar rules will obtain more and more in human nutrition and there will be, some time in the future, such a thing as scientific feeding of men.—J. H. Lyman, *Popular Science Monthly.*

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SATURDAY, SEPTEMBER 12, 1914

THE NATURAL YELLOW PIGMENTS OCCURRING IN THE BODY

"Luteins" or "lipochromes" are names that have long been current to designate the pigment or group of yellow pigments which may lend color to portions of the body rich in fats or to oily secretions derived from the organism. The identification of these yellow coloring-matters has usually depended on their spectroscopic properties. The lipochromes were associated with the fats and lipoid substances, not only because of their solubility in these, but also because they showed similar behavior toward fat solvents like ether and insolubility in ordinary menstrua like water. The more or less apparent resemblance of the colors of egg-yolk, the corpus luteum, some blood-serums, sebum, milk-fat, etc., was indicated by the use of a common term, "lipochrome," to cover the pigments of all these animal products. The differences between the so-called lipochromes, represented by slight variations in the solubilities and other properties have become magnified by comparatively recent demonstrations. It has been shown that the pure "lutein" of egg-yolk is isomeric with the crystalline xanthophyll of green plants;[1] whereas the lipochrome of the corpus luteum has been identified as a true carotin.[2] The difficulties involved in this modern chemistry of the animal pigments will be appreciated from the statement that only 4 gm. of crude crystalline pigment were obtained from 6,000 hen eggs, and less than 0.5 gm. of crystalline carotin from 10,000 cow ovaries.

Following these demonstrations of the nature of some of the animal lipochromes, the origin and physiologic relationships of these natural yellow pigments have been cleared up at the dairy chemistry laboratory of the University of Missouri, in cooperation with the United States Department of Agriculture.[3] The fat of cow's milk owes its natural yellow color to the pigments carotin and xanthophylls — principally carotin, the well-known, wide-spread, yellow vegetable pigments found accompanying chlorophyll in all green plants. The carotin and xanthophylls of milk-fat are not synthesized in the cow's body, but are merely taken up from the food and subsequently secreted in the milk-fat. When a milk-giving cow is fed with food practically free from carotin and xanthophylls, such as the cow usually receives during the winter months, the immediate supply of these pigments in the organism is greatly depleted and may be entirely used up, on account of the constant drain on the supply by the milk glands. The butter-fat accordingly approaches a colorless condition in proportion to the supply of carotin and xanthophylls in the system, the length of time these pigments are kept out of the food, and also very probably in proportion to the amount of milk-fat being produced. If food rich in carotin and xanthophylls is fed to a milk-giving cow whose milk-fat has become practically colorless by reason of the conditions above described, the organism will at once recover its lost pigments and the milk-fat will increase in color in proportion to the amount of carotin and xanthophylls, especially carotin, in the food. Fresh green grass, being probably the richest in carotin of all natural dairy cattle feeds, accordingly produces the highest-colored butter. There is some difference among the different breeds of dairy cows with respect to the maximum color of the milk-fat under equally favorable conditions for the production of a high color. Each breed of cows, however, will undergo the same variation in color of the milk-fat which follows a withdrawal or addition of carotin and xanthophylls, especially carotin, to the food.

The yellow lipochrome of the body-fat, corpus luteum and skin secretions of the cow, like the lipochrome of butter-fat, is composed principally of carotin, which sometimes has associated with it one or more minor xanthophyll constituents. The carotin and xanthophyll pigments of the body-fat are derived from the food of the cow.

In the light of these interesting facts discovered by Palmer and Eckles with regard to the nature of the pigments of milk-fat and body-fat and their simple physiologic relation to the carotin and xanthophylls of the food, it is not surprising to find that the hitherto practically unknown lipochrome of the blood-serum of the cow is also chiefly carotin and bears the same relation to the food as the milk-fat carotin. We are thus able to establish the connecting link between the food carotin and the carotin of the milk-fat, body-fat, corpus luteum, etc., of the cow. Associated in small quantity with the carotin of the serum, probably dissolved in the fat of the blood, are one or more xanthophyll pigments which are always found in more or less variable quantity associated with the carotin of

1. Willstätter, R., and Escher, H. H.: Ueber das Lutein des Hühnereidotters, Ztschr. f. physiol. Chem., 1911, lxxvi, 214.
2. Escher, H. H.: Ueber den Farbstoff des Corpus luteum, Ztschr. f. physiol. Chem., 1913, lxxxiii, 198.
3. Palmer, L. S., and Eckles, C. H.: Carotin—The Principal Natural Yellow Pigment of Milk-Fat: Its Relations to Plant Carotin and the Carotin of the Body-Fat, Corpus Luteum and Blood-Serum. I. The Chemical and Physiological Relation of the Pigments of Milk-Fat to the Carotin and Xanthophylls of Green Plants. II. The Pigments of the Body-Fat, Corpus Luteum and Skin Secretions of the Cow. III. The Yellow Lipochrome of Blood Serum. IV. The Fate of Carotin and Xanthophylls During Digestion. V. The Pigments of Human Milk-Fat, Jour. Biol. Chem., 1914, xvii, 191.

plants. A variation in the quantity of these pigments in the food results in a corresponding variation in the amount found in the blood-serum and milk-fat. Body-fat formed during this time will also be affected. The government investigators believe that the carotin is carried by the blood-serum in a firm combination with a protein.

The demonstration of the interrelation of food pigments and body lipochromes in cattle applies equally well to man in so far as the available evidence indicates. The fat of human milk may be tinted with the same pigments found in the fat of cow's milk. The relative proportion of carotin and xanthophylls in human milk is much more nearly equal than in the fat of cows' milk. This is not surprising when it is considered that there is strong evidence that the xanthophylls are conveyed through the body dissolved in fat, and when it is also considered that fat plays a much greater part in human food than in the food of the cow. The fat of the human body is often characterized by a marked yellow color. In view of the fact that the pigments of the milk-fat and body-fat of the cow are identical it must therefore be concluded that the pigments of the milk-fat and body-fat of human beings are also identical.

SCHOOL HYGIENE

The study of conditions surrounding school life which may injuriously affect the growth and development of the child, and proper appreciation of the related subject, the hampering influence of physical defects on the intellectual capacity of the young, have until quite recently received little consideration in this country.

The first attempt, probably, to exercise medical supervision of schools in the United States was by the city of Boston, in 1894, for the purpose of controlling the so-called contagious diseases of childhood. From this beginning, the movement has developed until now most of our cities maintain a more or less comprehensive supervision over all matters pertaining to school hygiene and the medical inspection of schoolchildren is mandatory in a number of states and elective in some others.

In this respect we are considerably behind European countries, notably Germany and England, where the system of medical school supervision is more extensively developed, has been longer in operation and is practically national in character. That this is so is largely due to the fact that consideration of the related triad, dirt, destitution and disease, has not been of such immediate importance with us, except in certain restricted areas.

School hygiene is a complex problem. It is generally conceded that our knowledge of its principles is greatly in excess of their practical application. The position of school medical officer presupposes, in addition to thorough training in physiology and psychology, a practical working knowledge of the physics of heat, light and ventilation, and an ability to recognize and coordinate the physical condition and educational needs of the developing child.

The need of skilled services and the expense incident thereto have been instrumental in restricting the practice of school hygiene largely to urban communities. This is unfortunate, because the great bulk of the school population of this country is as yet scattered over the rural districts.

The disproportionate prevalence of preventable diseases among urban and rural populations is not great; the necessity, therefore, of educating rural communities to the exercise of sanitary precautions necessary for the preservation of health is apparent. The importance of school hygiene in this respect is paramount, because the sanitary redemption of the majority of rural communities must largely be brought about through the practical education of the young in orderliness, cleanliness and the observance of sanitary precautions. Furthermore, the medical inspection of schoolchildren is in more or less intimate relation with the homes, which in turn are component parts of communities. The educational effect of school hygiene extends through these channels for the betterment of the community health.

The necessity for specialized medical services and the rather chaotic tabulation of the results of medical school inspections are largely responsible for deductions that do not bear analytic scrutiny. There is necessity for uniformity in methods of examination and of classifying the results for collective statistics to be of value. To state simply that a certain percentage of so many pupils have "defective teeth" may mean much or little. Certainly there is nothing in this classification to show whether the defect consists of one or more teeth needing attention or the presence of marked deformities. "Enlarged tonsils" do not always mean that the child should suffer the nervous shock attendant on a surgical operation; "diseased tonsils" are another proposition. Defects of vision and spinal curvature are frequently functional in character and due to "habits" of position acquired long before entrance to school, and have no connection with the equipment and arrangement of the classrooms. Much has been done along these lines, but there is need of uniform methods and systematic classification of results before these observations can be of value in studying mental and physical standards, and the effect of changing social conditions on development.

The object of school hygiene is primarily to place the impressionable child in the most favorable environment for physical and mental development and secondarily to detect and correct remediable defects which may impede intellectual training. The medical supervision of schools may, however, be further utilized by

the state in the determination of the prevalence of communicable diseases, especially in rural communities. The ultimate control of malaria, trachoma, tuberculosis and typhoid fever in these communities must be largely through educational methods. For these reasons the combination of the duties of the health officer with that of the medical supervision of schools appears eminently practicable. Furthermore, the health officer would have statutory authority to inspect premises, to abate nuisances and control foci of infection indicated by school medical inspections.

Intensive studies of the mental capacity of American schoolchildren, at varying ages, should be undertaken, in widely separated communities, with a view to the establishment of the normal mental standard, thereby rendering possible the study of the impress of immigration, and the effect of a changed social environment on the mental processes of the immigrant child, as revealed by similar examinations at the ports of entry.

THE VALUE OF HEALTH IN INDUSTRY AND WAR

There is food for reflection in the fact that the exigencies of commerce, the advantageous pursuit of industrial operations, and even the preparation for real or anticipated war may promptly bring about hygienic reforms which wide-spread preaching and earnest exhortation are at best slow in promoting. The "safety first" slogan which one hears in nearly every city of the United States at the present time is one aspect of a movement to increase the personal welfare of the individual by decreasing the liability to injury through the carelessness of a fellowman. The same spirit crops out in the "ten trade commandments" of the worker which are posted conspicuously here and there in factories where personal injuries and loss of life furnish unfortunate and—let it be frankly added—unprofitable incidents in the conduct of manufacturing operations. The reminder "thou shalt not" gains added force when its value is expressed in terms of practice and daily experience rather than in the more vague language of ethical considerations. And accordingly there is a telling force in such direct admonitions as the following, which we quote from a recent compilation for use in a factory:

"Thou shalt take no unnecessary risks, nor try to show off, nor play practical jokes, for by thy carelessness thou mayest do injury which will have effect unto the third and fourth generations to follow.

"Remember thou are not the only one on the job, and that other lives are just as important as thine own.

"Thou shalt not throw matches or greasy waste on the floor, as a dirty worker is a clumsy worker, and a clumsy worker is a menace to his fellow-workers."

These and similar timely suggestions, put in a form that is sure to attract notice, cannot fail to promote the mutual and reciprocal interest of the employer and the employed. Modern hygiene and preventive medicine have recognized long ago that the individual can no longer claim a liberty in his actions, independent of his neighbor. Our provisions for quarantine, vaccination against small-pox, and diverse other regulations in the interest of the public health have, in the past, been enforced only with the annoyance that comes from lack of cooperation and from personal resentments together with the indifference for restrictive rules that is bred in a community of "free" people. Yet now we see, in the combined enterprise and altruism of modern employers, protective devices put in operation to secure, without friction or resentment, the same sort of welfare results that the federal government or state or municipality would find difficulty in getting under way.

That the unexpected situations created by war have, in the past, furnished the stimulus for new inventions and useful processes is too well known to require detailed comment. It would appear in the present situation that the war against universal peace may actually be a war against intemperance. The armies and navies of to-day represent the most efficient fighting forces that the nations can command. No device, no agency that will contribute to their power and preparedness, is willingly neglected. Health is a prime consideration in this respect. Field Marshal Earl Kitchener is reported to have counseled the English soldiers to abstain from drinking while abroad, reminding them that their duty cannot be done unless health is preserved. The men were cautioned to keep constantly on guard against excesses. The German Emperor is said to have forbidden the "treating" of the soldiers in his armies. The sale of absinthe, imported by French soldiers in an earlier war, when alcohol was used to fight fever, has been restricted in Paris.

It is of slight consequence whether or not these rumors are entirely correct. They represent the current tendencies, which are undeniable by anyone who has watched the recent decisions of American naval authorities in the face of not a little apparently adverse criticism couched in the usual phrases concerning personal liberty. The truth is, that "the relation of alcohol and fighting has been squarely met, and the fact admitted that they are not compatible." A recent editorial writer has expressed this by saying that a temperate army was something not conceived of in the old theories of war; but a drunkard is to-day as much out of place in an army as he would be on a battleship. As every great conflict, whether of church or state, of labor or commerce, has brought out some permanent good, however clouded it may temporarily have been by the major issues at stake, so the horrible strife which the world is now experiencing may actually be developing a war against intemperance—a permanent advantage of no mean proportions.

A NATIONAL STANDARD REQUIREMENT FOR MEDICAL PRACTICE

The varying standards of medical practice in the several states have caused inconvenience and hardship from the time the states began to protect their citizens against incompetence and fraud. Complaint has frequently been made against the injustice inflicted on physicians who, after years of successful practice in one state, are obliged, before being permitted to practice in another, to submit to examinations on the same terms as if they were recent graduates. In one instance, at least, an eminent man with a national reputation was called on, when moving to another state, to undergo a written test of his ability and to remember text-book words, this test being administered, it was inferred, by one of his own former pupils.

Unlimited interstate reciprocity, on the other hand, is impracticable so long as the various states maintain differing standards for medical registration. A state which maintains a high standard obviously cannot be expected to reciprocate with a state which is satisfied with a low standard. Although the Constitution does not place the regulation of the practice of medicine among the functions of the federal government, nevertheless, it must be borne in mind that the Constitution does not prohibit the national government from assuming such a function should it be deemed desirable. The Constitution does not prohibit the establishing of a national standard or the making of such a standard obligatory. In practice, however, the national government has thus far left the control of these matters to the individual states. Not only is there no constitutional obstacle to the establishment by the general government of a standard for medical practice, and the provision of an examination, recognition of which shall at least be optional with the states, but, on the other hand, there are many strong reasons for such action.

Twelve years ago THE JOURNAL suggested[1] that all examinations for entrance into the various government medical services, instead of being given severally by the respective services, be given by one national board of examiners empowered to grant certificates or diplomas which should be a guarantee of a thorough and practical medical education and a prerequisite for candidacy for any medical position under the government. "The examinations should in part be conducted in hospitals and laboratories, so that practical and not theoretical knowledge would be demanded." The standard established should be such that, although its recognition as a credential for license by the state boards would be optional with the states, no state would have an excuse for refusing to recognize it. In fact, the practice acts of at least five states, Alabama, California, Colorado, Illinois and North Dakota, provide that the licensing boards may license without examination physicians who have passed the examinations and served as officers of the United States Army, Navy or Public Health Service. The routine is practically the same in such cases as in carrying out the idea of reciprocity, so called. In either case there must be a voluntary relinquishment of rights on the part of the state, and the state can only give its examining or licensing boards the privilege of accepting the credentials of a corresponding board of another state.

The idea was taken up by Dr. W. L. Rodman[2] before the Committee on National Legislation of the American Medical Association later in 1902. He argued that the states would no doubt be glad to recognize diplomas or certificates issued, after a rigid, broad and practical examination by a board of unassailable standing. This would not interfere with the work of the state examining boards, for only the exceptionally able and ambitious graduate would care to try for the national diploma.

Lieut.-Col. J. R. Kean,[3] in a recent address before the Federation of State Medical Boards, makes a practical suggestion toward the establishment of such a national examining board. The Secretary of War, he reminds us, is authorized to issue commissions as first lieutenants in the Medical Reserve Corps to graduates of reputable medical schools who pass an examination to be prescribed by the Secretary. No limit is placed on the number of reserve officers.

If, therefore, the President of the United States should appoint a board for the examination of officers for the Medical Reserve Corps, of a composition which would insure a high standard of requirement, and the state boards would agree to recognize without examination the holders of Reserve Corps commissions—as the states named above already recognize medical officers of the government services—the thing would be accomplished. If the laws of any state do not at present permit such recognition it would not be difficult to obtain the necessary legislation.

It would not be necessary to wait for favorable action by every state, for if the scheme were to be begun by even a few states, the rest could be expected to come into line as the desirability of the scheme became evident. It would obviously be desirable that the other medical services of the national government should join with the United States Army in a plan of such importance to the profession at large. The successful candidate would then have the qualification for a commission in the Medical Department of the Army, the Navy, or the Public Health Service, as well as a certificate of proficiency, "which would be the open sesame to the doors of state exclusiveness." As Kean

1. National Board of Medical Examiners, editorial, THE JOURNAL A. M. A., Jan. 11, 1902, p. 108.

2. Rodman, W. L.: A Voluntary Board of National Examiners, THE JOURNAL A. M. A., May 10, 1902, p. 1215, also editorial same issue, p. 1233.

3. Kean, J. R.: The Use of the Government Medical Services in Raising the Standard of Medical Education, Quart. Fed. State Med. Boards U. S., April, 1914.

says, "this board would not seek to examine a very large proportion of the recruits to the ranks of the profession or supersede, in any way, the state boards. . . . It is to do what a group of boards cannot do: to set a standard which all will accept; to be a mint which will stamp with its approval the good coin so that it will pass current in every part of the country, and not have to be weighed at every state line; to break down the barriers which, for acknowledged competence and ability, are unnecessary, vexatious and barbarous. It would be for the pace-makers and standard-makers of each year's crop of graduates; for the men who desire special honors or appointments; or for those who have migratory instincts and who may desire to enter some new field of work, and for whom the seal of approval of the general board would be valuable."

It may be of interest in this connection to note that Canada, which was confronted by a similar problem in the form of provincial rights that might not be gainsaid by the federal government, has surmounted the difficulty by the creation of a general medical council, whose registration the provinces had the privilege of accepting after the passage of permissive legislation. It is surely not to be imagined that so unfortunate an anomaly as our present chaotic system of registration is to remain an insoluble problem.

THE ALIMENTARY BACTERIA OF HEALTHY CHILDREN

The profound significance of the bacteria of the alimentary tract during the period of infancy is appreciated in a general way by every one who is concerned with the nutrition of children. It is nevertheless quite doubtful whether all of the manifold possible relations of the intestinal flora to the problems of health and disease are ordinarily comprehended by those who do not give considerable attention to the subject. Microorganisms can, of course, injure the individual by becoming the agents of infection. Pathogenic bacteria find their way through the alimentary barrier and may bring about digestive or other nutritive disturbance as a secondary consequence of some systemic disease for which they are responsible. Far more commonly, however, the bacterial invaders initiate harm by their immediate, local action on the food materials which they meet in the gastro-intestinal canal. It is in this respect that our knowledge of the situation is still far from complete.

Broadly speaking, we realize that proteins, fats, and carbohydrates are altered in specific ways through the agency of bacteria. The limited character of this information is exemplified by the use of the indefinite expressions, such as the "putrefaction," "growing rancid," or "fermentation" respectively of the three great groups of nutrients. In a way, furthermore, it is realized that the fermentative activities tend to preponderate over the putrefaction changes in infants when the diet is a natural one of milk. But there is nothing in such generalizations that is definite or specific enough to furnish very helpful guidance in times of alimentary trouble. The formation of abnormal products is never the result of the chemical processes of uncomplicated digestion. The harmful compounds arise only through the intervention of bacteria; the latter may belong to a specifically abnormal flora, or the normal alimentary flora may for some reason overstep the usual bounds of its activity and thus become abnormal in behavior rather than in its microbial character. Finally, ordinarily harmless organisms may completely change the nature of the products to which they usually give rise, if the character of the substratum that they subsist on is radically altered or other features of their environment become different. The intestinal flora of infants and young children therefore unquestionably deserves further study to determine more specifically than ever before the range of variety possible and the nature of the products which may be held responsible for physiologic effects of bacterial origin.

First of all and preliminary to a study of the morbid changes, it seems necessary to expand our knowledge of the conditions in health. A contribution has recently been furnished by Logan[1] from the research laboratory of the Royal College of Physicians at Edinburgh. His investigations agree in many respects with previous findings, notably the well-known experiments of Tissier.[2] In the intestinal flora of breast-fed infants —the ideal condition—the acid-tolerant group of organisms is immeasurably predominant, and is of the strictly anaerobic type called *Bacillus bifidus*. Coccal forms and lactose-fermenting bacilli are present, but scanty; spore-bearers are rare. In artificially fed infants the main difference is a decrease of the acid-tolerant group, and an increase in the lactose-fermenting group, along with the appearance of the non-lactose-fermenting organisms. The place of the *Bacillus bifidus* is now largely taken by the facultatively aerobic *Bacillus acidophilus*. The coccal forms show greater variety under this condition of diet. In children on both the breast and the bottle, a half-way stage between the two types of flora is observed. When children were fed a diet approximating more or less in type to that of adults, no one variety of organisms dominated the others as it does in the breast-fed individuals. The number of varieties present was greater. Coccal forms were numerous and very varied in type. The spore-bearing *Bacillus enteritidis sporogenes* was isolated in some cases.

These statistics emphasize very clearly the readiness with which the alimentary flora changes as the result

1. Logan, W. R.: The Intestinal Flora of Infants and Young Children, Jour. Path. and Bacteriol., 1914, xviii, 527.
2. Tissier: Compt. rend. Soc. de biol., 1899, li, 943; Ann. de l'Inst. Pasteur, 1905, xix, 109.

of relatively slight changes of diet (with its variable content of bacteria). If the simpler conditions of microbial life found in the breast-fed infant represent a great physiologic advantage, future efforts should be directed to learn how to prolong them even when the dietary regimen is necessarily altered.

Current Comment

KNOWN BY THE COMPANY IT KEEPS

The advertising manager of a certain cement company doing a national advertising business holds that, in spending his employer's advertising appropriation, it is his duty to demand of the publications he patronizes value received for the money paid. He feels that he does not get the true value when advertisements of his product are lined up with advertisements of fraudulent wares. To the advertising agencies he says:

"Will you please say to all newspapers desiring to carry our advertising that we decidedly object to being placed in close company with noisome patent-medicine ads and other fakes or near-fakes . . ."

To explain what he means, at greater length, the manager in an open letter to the Association of National Advertising Managers recalls a recent experience. Picking up a New York daily a few weeks ago, he found an advertisement unblushingly claiming that a certain "patent medicine" would cure consumption. He wrote, protesting, to the publishers of the paper who, in return, defended the advertisement and said they would continue to carry it. Commenting further on the atrocity of the claims made by the exploiter of the nostrum, the advertising manager says:

"Either this advertising doctor has a cure for consumption or he hasn't. If he is the great benefactor for which suffering humanity has looked in vain for generations, this newspaper would have a scoop and would at once give pages of free publicity. If it really believes what it aids this advertiser to say to consumptives, its editorial department is asleep at the switch."

This criticism will hold true of most "patent-medicine" advertisements. Wide-awake men in the advertising business realize that every dishonest advertisement weakens the opportunity of decent advertisers to gain the confidence of readers. Enlightened selfishness alone should impel the advertisers of meritorious and truthfully-exploited products to protest against being placed in company with swindling "patent medicine" fakers. The advertising manager just mentioned says: "Robbing consumptives or opening the door for such robbers seems to me to be business in which no decent man can engage." He might have added that the majority of schemes devoted to robbing consumptives and other sick persons would cease to exist were it not for the publicity which certain publications are willing to give them—for a consideration. The arguments and criticisms just given, while applying specifically to lay publications are applicable with equal force to medical publications. The medical profession has for years been pleading for the suppression of fraudulent advertising that directly affects the public health; at the same time our profession has tolerated and supported medical publications whose advertising pages have been, and in many cases still are, reeking with frauds just as vicious as those to be found in newspapers that cater to quacks and "patent-medicine" fakers. The only difference between a fraudulent "proprietary" and a fraudulent "patent medicine" is in the language used in advertising the two products. A lie is no less a lie because it is told in dignified language, and a fraud is no less fraudulent because it is perpetrated on the public through the instrumentality of physicians. What the advertising manager of the cement company said with regard to advertisements in newspapers and general publications applies with equal force to advertisements in medical journals:

"Gentlemen, the time for pious prating about truth in advertising is past. The public will soon give us the laugh of scorn if we solemnly talk about truth while hundreds of mediums are brazenly sharing in the spoils of dishonorable advertising."

THE SALUTARY EFFECTS OF MUSIC

To what are the beneficent effects of music due? Darwin, who never rested until he could explain a thing, if it were explainable, could nevertheless no more explain why musical tones in a certain order and rhythm afford pleasure, than we can account for the pleasantness of certain odors and tastes. "We know that sounds, more or less melodious, are produced, during the season of courtship by many insects spiders, fishes, amphibians and birds." After all, we need go no deeper for an adequate explanation than that influences, such as music, which are agreeable, are therefore salutary, and music is agreeable because its component tones are regular, periodic vibrations, even auditory waves precisely so many to each note, being in this regard unlike noises, which are irregular, dissonant, conflicting vibrations. Sound waves impinge on the hearing sense, whence the perception is conveyed to the brain. The benignant influence of music physically is by the transmission of its influence from the cerebrum through the sympathetic system, which directs the various organs. Thus not only is music physic for the soul, dissipating mental depression, soothing psychic perturbations; but its influence may also enhance nutrition, further digestion (as by the "liver music" of the French) and restore organic equilibrium. Indeed, the entire working of the human mechanism, physical and mental alike, may be lubricated by a stream of music, which art and science should therefore have a place in the medical armamentarium. It would no doubt be too much to expect every physician to be a performer on some instrument; yet illustrious colleagues have been skilled executants. Strümpell, for example, was an excellent violinist; Billroth was a superb player on the piano, and all the better surgeon for his graceful skill on that instrument. And who among "those present" could forget how in Boston several years ago, during the reception of the American Medical Association, the glee club made up of local physicians burst forth into concerted song, to the supreme delight of their hearers? There is agitation now in behalf of music as adjuvant to anesthesia; to this end some musical

skill might be required of medical fledglings in examinations for junior internships. In any event every physician could well be at least an appreciator of music and have some understanding of that most ingratiating art.

THE ABSORPTION OF WOOD ALCOHOL THROUGH THE LUNGS

The increasing use of wood alcohol in the industries and the growing appreciation of the toxicity of the substance, involving possibilities of harm far greater than the behavior of the closely related grain spirits, ethyl alcohol, would lead one to suspect, have given the impetus to extensive physiologic investigations. To some of these, notably the experiments of Völtz and Dietrich, we have referred in the past.[1] Usually the study of the effects of methyl alcohol has been confined to conditions in which it has been introduced into the organism by way of the stomach. In some of the industries, particularly those in which denatured alcohol containing the methylated spirits are employed, the possibility of absorption of vapors of wood alcohol through the respiratory passages and lungs must be reckoned with. A very recent investigation with this point in view, by Loewy and von der Heide at the Royal Agricultural College in Berlin,[2] has disclosed the surprising fact that quantities of methyl alcohol as small as 0.2 per cent. in the inspired air may lead to absorption of the product into the body in not inconsiderable amounts. The absorption is slow, so that some time may elapse before the organism is "saturated" with the alcohol. Somewhat unexpected is the fact that, under comparable conditions, fat animals take up decidedly less wood alcohol exhibited as vapor admixed with air than do lean subjects. This is due to the poor solubility of methyl alcohol in fats and lipoids, a fact demonstrated by the German investigators contrary to the current beliefs of the relatively ready solubility of the lower alcohols in fats and fat-like substances.

RED AND WHITE MEAT

The irritating action of the extractives of meat during excretion by the kidneys is well known and has been the basis of a rule of treatment limiting the use of these products and the meats containing them to a minimum in the treatment of parenchymatous and interstitial nephritis. Because certain red meats contained a large amount of extractives, the rule to exclude red meats and permit white meats and fish gained currency. More recently it has been shown that some white meats contain a high percentage of extractives, so that the chemical composition of the two varieties of meat does not differ sufficiently to justify a marked preference for the white meat over the red. On the other hand, there are those who still assert that the objection to red meats as opposed to white is well founded. Thus McCrae in Osler's "Modern Medicine"[1] says "All kinds of meats contain extractives, and the so-called dark meats to a greater extent than the light meats. Adler," McCrae says, "in a review of the subject, concludes that the prevalent idea that the subject of renal disease ought to eat light rather than dark meats is correct, and that these meats boiled contain the harmful factors less than when roasted." The fact is that the color is an insufficient criterion. The objection to extractives as irritating to the kidneys is quite correct and the important point is to determine for each kind of meat whether it contains a sufficient amount of the extractives to be injurious. The question thus seems to be reopened. Kindborg,[2] in the chapter of his text-book dealing with this subject, concludes that the old distinction between red and white meats cannot be sustained. He founds his recommendations for the use of meat in nephritis on the comparative amount of extractives in the individual sorts of animal food. Thus some sorts of fish are higher in extractives than most kinds of meat and their effect on the kidneys must be judged accordingly.

1. Völtz, W., and Dietrich, W.: Ueber die Beteiligung des Methylalkohols und des Aethylalkohols am gesamten Stoffumsatz im tierischen Organismus, Biochem. Ztschr., 1912, xl, 15; Some Public Aspects of the Wood-Alcohol Industry, editorial, THE JOURNAL A. M. A., Feb. 14, 1914, p. 538.
2. Loewy, A., and von der Heide, R.: Ueber die Aufnahme des Methylalkohols durch die Atmung, Biochem. Ztschr., 1914, lxv, 230.

1. Osler: McCrae in Modern Medicine, Ed. 2, iii, 784.
2. Kindborg, E.: Innere Medizin, iii, 90.

Medical News

ARKANSAS

Personal.—Dr. Walter K. Grey has been appointed local surgeon for the Iron Mountain System at Cotter.——Dr. William C. Tipton, Mountain Home, has been appointed physician in charge of the Confederate Soldiers' Home, Little Rock.

Home from Abroad.—Dr. and Mrs. James H. Buckley, Fort Smith, returned from Europe, August 12.——Dr. Ollie W. Clark, Pine Bluff, reached home from abroad, August 20.——Dr. R. Manton Wilson, Hope, who has been in Korea for eight years as a medical missionary, has returned home.

ILLINOIS

Personal.—Dr. Albert F. Storke, for five years president of the Board of Health of Oak Park, has resigned.——Dr. Clara Harrison Towne, Lincoln, has resigned as psychologist at the Lincoln State School and Colony.

Home from Abroad.—Dr. and Mrs. Robert S. Denney, Aurora; Dr. and Mrs. Karl F. Snyder, Freeport; Dr. Nina P. Merritt, Alton; Dr. Frederick E. Roberg, Joliet; Dr. George B. Kelso, Bloomington, and Dr. Ora L. Pelton and family, Elgin, have returned from abroad.

Chicago

Changes Field of Labor.—Dr. Thomas H. Glenn, formerly in charge of the pathologic and bacteriologic laboratories of the Northwestern University, has been placed in charge of the clinical and Roentgen-ray laboratories now being installed in the First National Bank Building, Fort Dodge.

Abroad and Home from Abroad.—Dr. Carl Langer and family and Dr. and Mrs. Bradford A. Camfield have returned from abroad.——Dr. and Mrs. Zenas H. Going are reported to be in London.——Dr. Anthony Biankini, Dr. Walter K. Allport, Dr. and Mrs. Alfred Schirmer and Dr. Hayden S. Barnard and family are still in Europe.

INDIANA

Reappointments on State Board.—The governor has reappointed Drs. Moses S. Canfield, Frankfort, and W. A. Spurgeon, Muncie, as members of the State Board of Medical Registration and Examination.

Indiana Physicians Returned and Abroad.—Dr. Malachi R. Combs, Terre Haute, has landed in New York.——Dr. and Mrs. Charles O. Bechtol, Marion, have reached home from Germany.——Dr. Manford M. Clapper, Hartford City, who had been marooned in London, has reached home.——Dr. and Mrs. Edward F. Hodges, Indianapolis, are said to be in London.

KENTUCKY

Personal.—Dr. B. Frank Eckman, Covington, has returned from Europe.——Dr. and Mrs. Frank T. Fort, Louisville, have returned from abroad.——Dr. W. Edward Grant, health officer of Louisville, who has been ill for four months, is convalescent and has resumed practice.

MARYLAND

Abroad.—Dr. H. Flournoy, resident psychiatrist at the Henry Phipps Psychiatric Clinic of Johns Hopkins Hospital, and a member of the medical reserves of the Swiss army, has left Baltimore to return to Switzerland, in answer to his country's call for reservists.——Dr. Ernest Zueblin, who is in Germany, has not been heard from and it is thought that he will remain in his country and assist in the army or in some hospital that will be established for the wounded.

Personal.—Dr. Robert F. Wells, Gamber, is ill with typhoid fever in St. Anthony's Hospital, Baltimore.——Dr. Charles R. Edwards, Baltimore, who was operated on for appendicitis, has recovered and resumed his practice in the University Hospital.——Dr. Thomas Boyle Owings is said to be critically ill at his home, Owings Glenn, Ellicott City.——Dr. Francis E. Harrington, Cumberland, has been appointed assistant epidemiologist in connection with the United States Public Health Service, Washington.

Home from Abroad.—Dr. Charles E. Hartwig of Baltimore who arrived on the refugee ship *Principessa Mafalda* from Europe tells of his capture by the Austrians as a spy. He was searched and questioned and turned over to the police of Vigi di Fassa. Eventually he proved his American citizenship and was released.——Physicians who have returned from Europe are Dr. Joseph Bloodgood, Dr. Frank Martin, Dr. Randolph Winslow and Dr. Frederick Baetjer; Dr. James T. Johnson, Cumberland; Dr. and Mrs. Alexander D. McConachie and Dr. Mary N. Browne, Baltimore.

MISSISSIPPI

Personal.—Dr. Edward C. Parker, Gulfport, has returned from abroad.——Dr. Thomas O. Hunter, Biloxi, registrar of the statistical department of the State Board of Health, is said to have been removed by Dr. Ethelbert H. Galloway, Jackson, secretary and executive of the board.

Progress of Hookworm Campaign.—The work in Jones County was brought to a very successful conclusion toward the end of August, over 2,500 cases having been treated. Hookworm was found in over 60 per cent. of all cases examined, the largest percentage being found in children. The people showed much interest and cooperated in the work. Many schools were found in which all the teachers and pupils were infected. Much infection in country schools is attributed to the ingestion of the eggs of the parasites in drinking-water obtained from springs near the schools.

MISSOURI

New Sanatorium.—Dr. W. S. Woodford, West Plains, has leased the Havens property in Carthage which was formerly used by Dr. Fulton as a sanatorium and will equip it and operate it as Woodford's Sanitarium. The institution will be opened some time next month.

Poison Selling Restricted.—An ordinance has been adopted by the city council of Joplin, placing restriction on the sale of morphin, cocain, heroin, carbolic acid and other poisons and also on the extracts and derivatives of habit-forming drugs. The ordinance also prohibits the distribution of sample packages or bottles of medicine.

Missourians Abroad.—Dr. and Mrs. Charles C. Dennie and Dr. and Mrs. Edward G. Blair, Kansas City; Dr. William F. Schmid, St. Joseph, and Dr. and Mrs. John J. Bourn, Hannibal, have returned from abroad.——Dr. Andrew L. Shoog, Kansas City, is said to have been placed in charge of the Salpétrière Hospital, Paris.—Dr. James W. Heddens and family, St. Joseph, are in Stratford-on-Avon, England.——Dr. J. Elliott Royer, Kansas City, is in a hospital in Bern, Switzerland, recovering from injuries received in a fall while mountain climbing.

St. Louis

Personal.—Dr. Wilhelmina A. Ragland is interned in Switzerland.——Drs. Christopher C. Morris and Walter R. Hewitt have returned from abroad.

Banquet to Hospital Board.—Hospital commissioner, Dr. Cleveland H. Shutt, and the hospital superintendents gave a dinner in honor of the members of the hospital board, August 29.

Leper Escapes from Colony.—George Rusuls, a Greek, who has been under the observation of the health authorities for leprosy and was sent to join the leper colony at Quarantine, August 29, escaped a few hours later.

Hospital Opened.—The three-story building at Grand Avenue and Palm Street, recently purchased for $30,000 by the board of benevolence of the Christian Church, which has undergone extensive alterations and decorations, will be opened in a short time as the Christian Hospital. The institution has a capacity of fifty beds, and the officers of the staff are, Dr. Julius C. Heinrichs, president; Dr. Albert E. Meisenbach, vice-president, and Dr. Treston R. Ayars, secretary-treasurer.

MONTANA

Personal.—Dr. Fred F. Attix, Lewistown, has returned from abroad.——Dr. Robert I. Rizer and family, Anaconda, believed to be in Vienna.——Dr. Charles R. Blake, Butte, and Harry A. Bond, Dillon, have entered into partnership.

Prosecution of Milk Dealers.—The first prosecution of milk dealers in Cascade County was conducted July 17, at Great Falls, when the proprietors of five local eating houses were tried in the justice court for selling milk containing less than the standard percentage of butter fat. Three of the restaurant proprietors were tried and found guilty, and two pleaded guilty without the cases coming to trial.

NEW YORK

Personal.—Dr. Baxter T. Smelzer, Albany, has returned from abroad.——Drs. Thomas A. Ryan and Edward G. Griffin have been appointed examining physicians for the Albany District by the State Compensation Commission.

Wants Psychopathic Ward.—In a report made to the health commissioner of Buffalo by Dr. Baron Ross Nairn, examiner in lunacy, an appeal is made for a better psychopathic ward for the care of Buffalo patients under observation for supposed lunacy.

Children's Haven Opened.—On August 29 the Children's Haven at Far Rockaway was formally opened by Health Commissioner Goldwater. This home has accommodations for thirty-five and will care for children whose widowed mothers are in hospitals.

New York City

Personal.—Drs. John W. Draper, William J. Robinson and wife and George W. Jean have returned from abroad.——Dr. Lewis S. Pilcher, Brooklyn, has been elected surgeon-general of the Grand Army of the Republic.——Dr. Moses S. Kakels, Dr. Sara Welt-Kakels, Dr. John Warren and Dr. M. E. Rhein have returned from Europe.

NORTH CAROLINA

Home from Europe.—Drs. Lucius N. Glenn, Gastonia and Jacob F. Highsmith and daughter, Fayetteville, have returned from abroad.

Field Hospital Encamped.—Field Hospital, No. 1, N. C. N. G., encamped the last week in August at Camp Battle near Hendersonville. More than one hundred members were present.

Antityphoid Vaccination.—The North Carolina State Board of Health is now furnishing antityphoid vaccine, and in Robinson County alone more than 2,800 inoculations have been made.

Health Seekers Society Chartered.—The Asheville Health Seekers Society has been incorporated without capital by D. A. Pressley, W. P. Harvey and James Williams, with the object of providing friendly attention for worthy tuberculosis patients, funds for their needs and a sanatorium for the care of patients with small means and those who are indigent.

Personal.—Dr. J. Vance McGougan, Fayetteville, gave his annual entertainment to the Cumberland and Hoke Counties Medical Society, August 20, at his country place.——Dr. James M. Covington, Wadesboro, has been added to the state hookworm commission.——Dr. Samuel W. Hurdle, Reidsville, has been appointed whole-time health officer of Rockingham County, vice Dr. Samuel Ellington, Wentworth, resigned.

OKLAHOMA

Personal.—Dr. Charles R. Preston, Mountain Park, lost his office furnishings by fire, recently.——Dr. George W.

Sutton, Cleveland, has purchased the Bartlesville Hospital and has remodeled it and increased its capacity to twenty-five beds.——Dr. Alva A. West, Guthrie, will remain in England during September.

The Tables Turned.—Dr. G. Fowler Border, Mangum, was recently made the object of an unusual attack. It is alleged that an attempt was made by two women to induce him to perform a criminal operation, a dictograph having been placed in the room before the conference. Dr. Border, instead of being trapped, trapped the trappers. Two arrests have been made and Dr. Border is said to have filed suit for $100,000 against the Burns Detective Agency, Chicago.

PENNSYLVANIA

Personal.—Dr. Henry J. Benz has succeeded Dr. Henry B. Burns as superintendent of the Bureau of Child Welfare of Pittsburgh.

Physicians Entertained.—The Carbon County Medical Society was entertained by Dr. John W. Luther, Palmerton, at a clambake and cornroast recently, at Lake Mineola near Brodheadsville.

Home from Europe.—Dr. Martin E. Griffith, Monessen; Dr. and Mrs. George B. Kunkel and son, Harrisburg, and Dr. Charles H. Schlesman and son, Allentown, have returned from Europe.——Dr. Tyrus E. Swan, Easton, has reached London on his return home.

Bulletin on Health of Schoolchildren.—Dr. Samuel G. Dixon, state health commissioner, issued his thirty-first *Weekly Bulletin*, August 30. It deals with the health of schoolchildren and the care and attention which should be paid to them before entering the school that much illness from contagious diseases may be prevented.

Philadelphia

Personal.—Dr. Charles B. Penrose arrived from Europe September 3.——Dr. Howard F. Hansell arrived in New York September 2.——Dr. James William White is taking a trip through the Puget Sound Country and British Colony.——Dr. Walter L. Pyle has returned after a trip to Demerara, British Guiana.——Dr. Karl Schaeffle has succeeeded Dr. Eward B. Shellenberger, Harrisburg, as deputy medical inspector of tuberculosis dispensaries.

Million Assured for Blockley.—It has been announced that Councils' Finance Committee will yield to the demand of the physicians that the next loan shall include $1,000,000 to start the reconstruction of the Philadelphia General Hospital. While the overcrowding has been relieved to considerable extent by the removal to Norristown of many of the insane and indigent patients, and by other arrangements, there is still insufficient room at Blockley and, what is worse, it is impossible to give modern treatment in accordance with advanced ideas of sanitation in the present old buildings.

Rat Receiving Station.—On September 4, a rat receiving station was installed at the Race Street Pier and the payment of bounties for live and dead rats began. William J. Wahl, an inspector of the Board of Health, is in charge of the station, which is open from 8 a. m. to 5 p. m. and is connected by telephone with the electrical bureau. Thirty rats taken from the liner *Merion* which docked from Liverpool, have been taken to the city laboratories to be examined for traces of bubonic plague. Rats are being taken from the holds of all vessels docking at this port, as a part of the campaign instituted by Director Harte of the department of health and charities. A corps of nearly a score of special agents is inspecting vessels as they arrive, and also is collecting rats from several hundred traps placed along the Delaware River front between Girard Avenue and Reed Street. It is hoped in this way to keep out the bubonic plague.

TENNESSEE

Hookworm in James County.—Dr. Yancey, state hookworm examiner, after an investigation in James County, declared it heavily infected with hookworm. Of about 100 children examined, 75 were found infected.

From, to and in Europe.—Drs. Herbert T. Brooks and Otis S. Warr, Memphis; Drs. George Manning Ellis, Edwin Dunbar Newell, German P. Haymore, Henry Berlin, James H. Atlee, James A. Smith and John S. B. Woolford, Chattanooga; Drs. Albert G. Kern, Knoxville, and Albert W. Harris, Nashville, have returned from Europe.——Drs. Cary Snoddy and Robert H. Newman, Knoxville, sailed on the hospital ship, *The Red Cross*, September 9.——Dr. Hiram B. Jacobsohn has reached Rotterdam from Vienna on his way home.

TEXAS

South Texas Physicians to Meet.—The annual meeting of the South Texas Medical Society will be held in Corpus Christi, September 15 and 16, under the presidency of Dr. F. W. Painter.

Health Exhibit Car.—The appropriation of $10,000 made by the thirty-third legislature is sufficient to equip and maintain a health exhibit car which will start on its journal over the state this month. The car will be accompanied by a director and a corps of lecturers and demonstrators.

Physicians Abroad.—Drs. Edward H. Cary and Garfield M. Hackler, Dallas; Otto K. Peters, Galveston; Samuel P. Cunningham, San Antonio, and Joseph Gilbert, Austin, have returned from abroad.——Dr. James W. Ward, Detroit, is believed to be in Vienna.——Dr. and Mrs. Harold L. Warwick, Forth Worth, are in London.

Personal.—Dr. Edmond Doak, heretofore associated with the Taylor Sanitarium, has purchased a third interest in the Taylor City Hospital.——The Whiteside Office Building, owned by Drs. E. F. and M. A. Whiteside, Timpson, was burned August 6, with a loss to Drs. Whiteside of $2,000 in office books and instruments, and of $1,500 to Dr. Ollie F. Johnson.

GENERAL

Colored Physicians Meet.—The National Medical Association held its annual meeting in Raleigh, N. C., August 25 to 27 and elected the following officers: president, Dr. Frank S. Hargrave, Wilson, N. C.: vice-presidents, R. C. Brown, D.D.S., Richmond, Va., and W. A. Jones, Ph.G.; secretary, Dr. Walter G. Alexander, Orange, N. J.; assistant secretary, Dr. G. R. Ferguson, Charleston, S. C.; treasurer, Dr. J. R. Levy, Florence, S. C. It was decided to meet in Chicago in 1915.

Hospital Chiefs Confer.—At the sixteenth annual meeting of the American Hospital Association held in St. Paul, August 24 to 28, the followings officers were elected: president, Dr. William O. Mann, Boston, superintendent of the Boston Homeopathic Hospital; vice-president, Dr. Arthur B. Ancker, superintendent of the St. Paul City Hospital; W. W. Kenney, superintendent of the Victoria General Hospital, Halifax, N. C., and Miss Ida N. Barrett, superintendent of the Grand Rapids (Mich.) Hospital; secretary, Dr. Harry A. Boyce, superintendent of Kingston General Hospital, Kingston, Ont., reelected, and treasurer, Asa Bacon, superintendent of the Presbyterian Hospital, Chicago, reelected. It was decided to hold the next meeting of the association in San Francisco.

Prevention of Tuberculous Infection in Children.—The trustees of hospitals for consumption for Massachusetts have sent a circular letter to physicians of that state calling attention to the responsibility resting on the profession in the prevention of consumption, especially among children. The trustees suggest that it is tuberculous children who cannot stand the strain of young adult life that furnish our thousands of new cases of pulmonary tuberculosis each year. It is the opportunity of physicians, first to protect these children from infection, and second, to see that they are cared for when such infection has taken place. When actual disease is evident the case has probably gone beyond the stage when cure is possible. A diagnosis of "infection" as contrasted with a diagnosis of "disease" is the key to this problem. Physicians are requested to aid by reporting these cases, simply as a matter of record, to the State Board of Health, which will furnish special cards for the purpose.

The Plague in New Orleans.—Since the report of bubonic plague in the last issue of THE JOURNAL, three cases of human plague and eleven cases of rodent plague have been discovered. The human cases are as follows: Case 23, Max Neuman, white, male, nativity, United States; residence, 421 Harmony Street; employed at grocery store, corner Carrollton Avenue and Green Street; aged 19; sickened, August 29, with left femoral bubo. Case 24, Ethel Ticker, white, female, residence, 1742 Touro Street, corner Roman Street; sickened September 1, diagnosis positive September 2, with left femoral bubo. Case 25, Lloyd Wilson, white, male, occupation, plumber; residence, 1824 Baronne Street; sickened September 1, suspicious September 2, diagnosis positive September 3, left femoral bubo. Cases 75 to 85, inclusive, of rodent plague have also been found. During the week ended August 29, in the Department of Outgoing Quarantine, 81

vessels were fumigated with sulphur; 15 with carbon monoxid; 9,764 pounds of sulphur were burned; 15,736 tons of outgoing freight were inspected and 32 clean and 6 foul bills of health were issued. The Overland Freight Inspection Department inspected 3,925 cars; rat-proofed 1,230 cars, and condemned 9 cars. No rodents were killed in cars during the week. In the Department of Field Operations, 9,178 rats were trapped, 4 premises were fumigated, 40 premises were disinfected, 3,726 premises were inspected, 150,008 poisons were placed, 1,926 notices were served, 117 buildings were rat-proofed, 774 abatements were made and 121 dead were inspected. In the Department of Laboratory Operations, 8,235 rodents were received, of which 6,614 were examined, 18 were found suspicious and the diagnosis of plague was confirmed in 14. The total number of rodents trapped thus far is 64,063 and of these 58,599 have been examined.

CANADA

Medical Corps Organization.—Previous to 1899 there was no Army Medical Corps in Canada, each regiment having its own medical officers. At the present there is an organized system of 700 medical officers and 1,800 non-commissioned officers and men. Sir Ian Hamilton recently reported that the medical corps keeps well ahead of every other branch of the military service in its completeness and preparations for war.

Personal.—Dr. Max Klotz, Ottawa, immediate past president of the Ontario Medical Council, who has been doing graduate work in Germany, has arrived in England and will sail for home immediately.——Dr. George Strathy, Toronto, has returned from England.——Dr. Walter Wright, Toronto, is now doing work in Moorfields, London, England.——Dr. D. W. McPherson, Toronto, left the past week for Valcartier Camp near Quebec, in charge of the Army Medical Corps, Toronto, Dr. Wallace Scott was second in command.——Dr. D. A. Clark, Toronto, has gone with his regiment to the camp.——Dr. S. P. Ford, Norwood, Ontario, who has practiced in that village for fifty years, was recently tendered a banquet and a congratulatory address by the physicians of Peterboro and surrounding country.——Dr. G. G. Nasmith, bacteriologist to the Toronto Board of Health, is at Camp Valcartier watching the water supply.——Dr. George R. McDonagh has returned to Toronto from England.——Dr. William Burt, Paris, Ont., Drs. Charles J. Hastings, Herbert J. Hamilton and Augusta Stowe Gullen, Toronto, have been reelected to represent the graduates in medicine on the senate of the University of Toronto.——Dr. A. T. Shillington, Ottawa, is in charge of the medical services at Camp Valcartier. He states that out of a total of 33,000 in camp, but fifty-one have developed any illness.

WAR NOTES

Russia Organizing a Corps for Cholera Service.—The Russian authorities are considering a proposal to establish a corps for cholera service to consist of 10 medical men and 20 nurses.

Medical Service in England.—As many practitioners and panel physicians have taken places in military service, arrangements are being made to fill their places temporarily and conserve their practices during their absence .

Foreign Medical Publications.—Recent issues of foreign medical publications are exceedingly thinner in bulk and especially in original contributions. The issue of the *Lancet* for August 29 is the annual Students' Number and contains no original articles. Much space is given in current British journals to war news.

England to Manufacture Synthetic Drugs.—Agitation is being made for English chemical companies to arrange for the manufacture of German synthetic products. Duty free alcohol is being urged to aid manufacturers in this work. The patent laws are such that firms who will undertake to manufacture the necessary products at this time may continue to do so even after peace is declared. Edward White, president of the British Pharmaceutical Society, has recommended that sodium salts be substituted for potassium, as Germany is the great source of the latter.

Compulsory Antityphoid Vaccination of English Army Urged.—Sir W. B. Leishman has published a letter urging compulsory antityphoid vaccination for the British army and pointing to the American success during the mobilization in Texas. As it is impossible to vaccinate all the recruits en masse, Lord Kitchener has expressed a wish that all may be vaccinated as rapidly as occasion offers. Antityphoid vaccine is supplied on requisition from the Base Depot of Medical Stores, and medical officers are urged to seize every opportunity to increase the number of the inoculated.

Switzerland Appeals for Aid.—The Official Information Bureau of Switzerland, located in New York, writes that the Swiss Republic has been compelled to call to arms the entire Swiss army of 300,000 men, in order to be prepared to enforce and defend the neutrality of the country. This leaves the harvests to be gathered by the aged and by women and children, and imposes a heavy burden on the 3,500,000 population, more particularly as the customary trades and industries of the country are at a standstill. An appeal is made to Americans for contributions to meet the needs of the destitute; these may be sent to the Swiss Relief Fund, 241 Fifth Avenue, New York.

Surgical Scissors and Forceps.—Few physicians realize that all, or nearly all, surgical scissors and forceps are imported, most of them from Germany. The war, of course, has closed practically all the surgical instrument factories. A correspondent who is interested in the subject, and who has just returned from abroad, writes: "While I was in Europe I saw factory after factory where the first call took out from 60 to 85 per cent. of the men. There is no doubt but that the instrument business of this country will be in bad shape inside of the next sixty days." This means that it will stimulate and encourage our home instrument-makers to undertake the manufacture of these instruments.

Pharmaceutical Arrangements in Austria.—The Austrian Department of the Interior has issued an order requiring the public pharmacies to be kept open as far as possible. In case the proprietor or the responsible manager of the pharmacy is compelled to be absent for military service, a master of pharmacy can be entrusted with the conduct of the pharmacy without the requirement of a definite period of professional service. The order also provides that in cases in which a master of pharmacy cannot be obtained, and there is an urgent necessity for a public place for the furnishing of medicines, a medical house pharmacy can be established. The order further provides that in such cases a sign, giving the residence of the physician conducting the pharmacy, shall be distinctly displayed to the public and similarly in the case of pharmacies whose business must be suspended, a sign indicating the nearest accessible pharmacy must be displayed.

Conditions of Life in Paris.—Three weeks after the mobilization, as noted by a special correspondent to the London *Lancet*, the greatest change in Paris was in the traffic arrangements. All buses have ceased operations and the city is much more quiet. All horses and private motor cars were commandeered. The street railway ceased operations except from 7:30 a. m. to 7:30 p. m. and the wives of the employees took their places. Food conditions generally are fair and arrangements are being made to conserve the food supply. Notices have been posted urging all who have not been vaccinated in the last five years to apply at any of the hospitals or the vaccination bureaus which have been established. Directors of primary schools and medical inspectors have been instructed to vaccinate all children. Among other sanitary measures, burning of all rubbish and boiling of water have been urged. No wounded soldiers are sent to Paris for the present; they are being sent to the provinces.

Red Cross Expedition Sails.—The American National Red Cross steamer, *Red Cross*, formerly the Hamburg-American steamer, *Hamburg*, was still at New York September 9, having on board ten hospital units to assist in the care of the wounded in the European armies. Major Robert U. Patterson, M. C., U. S. Army, is in command of the detachment and the officers of the units are as follows: (1) Dr. Reynold M. Kirby-Smith, Sewanee, Tenn., director; Drs. John A. C. Colston and Martellus H. Todd, Baltimore, assistants; (2) Dr. Roades Fayerweather, Baltimore, director; Drs. Lewis C. Spencer and Harry Richmond Slack, Baltimore, assistants; (3) Dr. William S. Magill, New York City, director; Drs. Philip Newton, Washington, D. C., and Paul H. Zinkhan, Salem, Ore., assistants; (4) Dr. Robert W. Higgs, Buffalo, N. Y., director; Drs. Fred W. Eastman and Henry N. Shaw, assistants; (5) Dr. Edward H. Egbert, Washington, D. C. director; Drs. Brown S. McClintic, Peru, Ind., and Arthur M. Zinkhan, Washington, D. C., assistants; (6) Dr. Charles H. Sanders, Washington, D. C., director; Drs. John S. Spearman, Baltimore, and Grover A. C. Stem, Washington, D. C., assistants; (7) Dr. Cary A. Snoddy, Knoxville, Tenn., director; Drs. Fred G. Benton, New York City, and Wilcott Denison, St. Louis, assistants;

(8) Dr. John D. Bartlett, Galesburg, Ill., director, Drs. Russell A. Jewitt, Cleveland, and John C. Miller, Shenandoah, Pa., assistants; (9) Dr. Howard W. Beal, Worcester, Mass., director; Drs. Veader N. Leonard, Baltimore, and William T. Fitzsimons, New York, assistants; (10) Lieut. Col. Bial F. Bradbury, M.C. Maine N.G., Norway, director; Drs. Robert H. Newman, Knoxville, Tenn., and John Lancer, New York, assistants. Its sailing was delayed because of protest from foreign consuls regarding the large number of Germans, not American citizens, on the crew.

Shortage of Medical Supplies in Austria.—The influence of the war on the market for drugs is felt not only in this country but even in Austria although she is an ally of Germany in which so large a part of the drugs used is manufactured. As will be seen from another item, the German Emperor has forbidden the exportation of a large number of very important drugs. The "Pharmaceutische Post" for August 8, calls attention to the effect of this law on the drug market in Austria and to the unfortunate position which a nation is in when it has to depend on other nations for its important drugs. Most chemical preparations, among them the most important alkaloids like morphin, the analgesics and hypnotics, are not produced in Austria but only in Germany, and at present cannot be imported on account of the necessities of the war.

This situation affects not only public pharmacies, but also the public hospitals and even the military hospitals which must supply their needs through the wholesale druggists. A circular from the latter has already been sent to pharmacists in which they have set forth the serious economic condition that has been called into being by the war and demand attention to these conditions on the part of pharmacists. They also make the announcement that they will furnish goods only for cash and are compelled to make an advance of 15 per cent. on all goods. Some makers of bandage material have raised the prices in their list from 40 to 80 per cent. Under such circumstances it is impossible that pharmacists shall maintain the price of medicines established by law, and permission must be given them, according to the Post, to make on their part, a corresponding increase in their charges.

The standing committee of the Vienna Medical Chamber and of the Economic Organization of Physicians of Vienna has also addressed a public request to the Vienna physicians to prescribe imported alkaloids only in the amounts absolutely necessary.

Exportation of Medical Supplies from Germany Forbidden.—In its current issue the *Pharmaceutical Post* published in Vienna, quotes from the Berlin *Drug News* the following order issued by the kaiser:

We, William, by the grace of God, German Emperor, King of Prussia, etc., in the name of the Empire, with the complete concurrence of the Bundesrat, issue the following orders:

1. The export and transport across the boundaries of the German Empire of material for dressings and remedies, as well as surgical instruments and apparatus, is forbidden until further notice.

2. The Imperial Chancellor will publish a list of articles whose export and transportation is forbidden according to Section 1. He is empowered to permit exceptions to conditions in 1 and to establish necessary regulations.

3. The present order is to take effect on the day of its announcement (publication).

In witness whereof, behold our Imperial signature and the impression of the Imperial seal.

Given at the New Palace, July 31, 1914.

(L. S.) Wilhelm,
von Bethman Hohlweg.

In connection with the above, the following announcement is published:

On the basis of the second paragraph of the Imperial orders of July 31, 1914, regarding the prohibition of the export and transportation of dressing material, remedies and surgical instruments and apparatus, I make public announcement that the following articles come under this prohibition: Pure carbolic acid, mercury, corrosive sublimate, iodin, potassium iodid and sodium iodid, iodoform, chloroform, pyrazolonum phenyldimethylicum (antipyrin) and its derivatives (pyramidon, etc.), powdered opium, morphin and its salts, codein phosphate, paraformaldehyd, quinin hydrochlorid and sulphate, arecolin, salvarsan, absorbant cotton, gauze for dressings and other dressing material, surgical and other medical and dental instruments and apparatus, bacteriologic apparatus, material for bacteriologic media (agar, gelatin, peptone), vaccine virus, prophylactic sera and curative sera for infectious diseases and also experimental animals.

Berlin, July 31, 1914.

I. V. Delbrück,
Imperial Chancellor.

On September 8, Representative Metz reported the raising of the export embargo on dyestuffs via Rotterdam, including medicinal products with the exception of chloroform, carbolic acid, serums and salvarsan.

LONDON LETTER

London, Aug. 14, 1914.

Libel Action Against the British Medical Association

A nostrum proprietor named Stevens has brought an action against the British Medical Association for statements made in "Secret Remedies," the book in which the association has exposed various quacks. It may be remembered that last year this individual, who professes to cure consumption, brought an action in which the jury disagreed. In the present case he appeared in person. In addressing the jury he claimed that he had discovered a cure for consumption which had proved successful in his case when sent to South Africa seventeen years ago by his family doctor. In the association's book it is stated that "the vendor considerately warns the public against American quacks and impostors," but though so engagingly candid about his rivals he follows the plan of sending one letter after another to any sufferer whose name he may have obtained, a system which seems to have been invented in America. His circulars have a character of their own, because of his effrontery to the medical profession. Persons who respond receive a list of questions to be answered by their doctor and are advised to continue under his observation that he may be impressed by the marvelous qualities of the remedy. He also said, "The great drawback to my cure so far as the medical profession is concerned has been the fact that I would not reveal its formula. This is now done away with. The formula is 80 grains of umckaloabo root and 13 grains of chijitse to every ounce prepared according to British Pharmacopeia methods." The book commented on "the farce of revealing a formula by the employment of such fancy names as one of the oldest dodges of the quack medicine man." The following analysis was given: "The medicine contained in 100 fluid parts 21.3 alcohol, 1.8 glycerin and 4 solid substance; the latter contained about 1 part of tannin and 0.2 of ash. The solid substance agreed in all respects with the solids of decoction of krameria." In his advertisements Stevens guaranteed to cure the patients or to return the money in full. He also alleged that he returned to England to prove his cure to the satisfaction of the British government.

For the association evidence was produced that a man who went to see Stevens concerning some clerks in the same employ said he was subject to colds in the head. Stevens volunteered to examine him and said that his left lung was in a bad condition and gave him an injection. He subsequently saw a chest specialist who found there was nothing the matter with him. Dr. Bullock, a pathologist, said that he experimented with Stevens' remedy and found that it had no bactericidal properties, although the claim was made that a dilution of 1:100 killed tubercle bacilli. Sir Richard Douglas Powell, former president of the Royal College of Physicians, stated that he knew no remedy which would cure consumption. A physician from West Africa gave evidence on behalf of Stevens. He had heard the name "umckaloabo." It was a Kafir word meaning "life everlasting" and was applied to a plant in Kafir Land; a decoction made from it contained a vegetable parasite which was an antitoxin for chest complaints. Stevens produced several witnesses who stated that they had been cured of consumption by him. Well-known specialists gave evidence that there was no proof that these persons had suffered from consumption. It was also shown that although Stevens issued guarantee bonds promising to refund the money if a cure was not accomplished, yet when his patients died and their families, who were in poor circumstances, applied for the return of the money, he refused to give it. The jury returned a verdict in favor of the defendants. The British Medical Association is therefore to be congratulated on its successful exposure of this quack.

Jews and Consumption

It is generally held that Jews are much less liable to tuberculosis than other white races. That this view requires some qualification seems to be shown by Dr. D. L. Thomas, Health Officer for Stepney, a district in the East End of London mainly inhabited by Jews. He holds that consumption is more common among Jews than other classes and that it is undoubtedly on the increase among them. The return of cases notified and the number of deaths in certain model dwellings occupied by 5,789 Jews and 6,848 Gentiles, showed that in the buildings entirely occupied by Jews, 95 notifications were received, and there were 14 deaths or 14.7 per cent. of the persons attacked. In the buildings where there were no Jews, 26 notifications were received and there were 6

deaths, a percentage of 23 of those attacked. So that a greater percentage of Jews than of Gentiles contracted the disease, but a smaller percentage of those attacked died. These figures, adds Dr. Thomas, "tend to confirm the opinion I have frequently expressed, that pulmonary tuberculosis is more common among Jews than others and that it appears to be of a more chronic nature. Its chronic character may be the cause of its greater prevalence among Jews. Some of these chronic patients live for many years. They cough and expectorate quantities of sputum laden with tubercle bacilli, and are the center of infection for many years. The danger of this in crowded rooms or in workshops where many work in close proximity to each other, is obvious." In regard to the above statistics it must be borne in mind that the Jews in Stepney are among the poorest and most down-trodden of their race. Driven by oppression out of Russia they seek refuge in England, where they overcrowd certain slums and begin the struggle for existence at a disadvantage.

BERLIN LETTER

(Delayed in transmission)

BERLIN, Aug. 8, 1914.

The War

Although we have been prepared for years for an attack from Russia, France or England, the gigantic war in which we are now involved quite unexpectedly has naturally affected German physicians severely. In an economic way it bears on the entire profession, especially on those liable to military service by the call to service in the army. Aside from the army surgeons belonging to the standing army, the surgeons who are on furlough (reservists) were immediately mobilized. In addition, a large number of physicians in civil life who, in part, are no longer bound to military service, and in part have never performed it, have placed themselves at the disposal of the war department mostly, for hospitals which will later be erected in their own home towns. It is at present not possible to determine the number of physicians who have gone into active service, but if one estimates from comparison with the conditions in the Franco-Prussian war of 1870-1871, there would be about 12,000 physicians in the army. Naturally the question arises, How will the civil population receive medical care in the absence of so large a number of physicians? The representatives of the medical profession made immediate provision for active help in this matter. The Medical Chamber of Berlin-Brandenburg has required all the physicians of its district who are in the position to do so to assume without charge the practice of their colleagues who are in the field, and among the physicians who have already given notice of their willingness to serve in this way a representative service has already been organized. It is distinctly provided that the substitute shall fully assure the income to his colleague serving in the army or to his family. Similar measures will doubtless be taken in other parts of Germany. The task of providing that the families of physicians who are deprived of their support through service in the army shall receive material aid so far as possible is of especial importance. Also in this respect the Medical Chamber of Berlin-Brandenburg has already taken steps to the extent that the loan committee has announced that it will allow loans to the needy families without interest so far as its means permit. In the *Deutsche medizinische Wochenschrift*, it is further stated that the great fund of the Leipsic League amounting to more than $250,000 (1,000,000 marks) which was raised for the aid of physicians in their conflict with the insurance societies and which is no longer of value for its original purpose, is to be devoted, as far as possible, to needy members and their families. If these and similar measures of the authorities of the profession are insufficient to provide the needed assistance, there is no doubt that physicians of means who remain at home will provide funds for the welfare of the profession.

The great enthusiasm which prevails among the German people expresses itself not only in the readiness to go to war, but also in the willingness for sacrifice which is necessary to provide means for the care of the wounded. Already in the first days of mobilization, a fund was provided of about $250,000 (1,000,000 marks) by some banks and private individuals, to which the kaiser alone contributed from his private purse $25,000 (100,000 marks). The offer of the American Red Cross to send an expedition of three surgeons and twelve nurses with the necessary material to care for our wounded, communicated by the American government through its ambassador, has been received with marked appreciation. The resolution of the members of the Society of American Physicians of Berlin to offer their services to the German army has been received with no less favor.

Naturally, the military hospitals are of the first importance for the reception of the wounded. Next come the state and municipal hospitals which, in consideration of the enormous size of the army and the extent of the individual battles, must soon be made use of. Moreover, physicians have already offered their private clinics for this purpose. Further, some of the nobility have arranged to care for the wounded in their castles. The Kaiser Wilhelm Academy of Berlin for the instruction of army surgeons is arranged for the care of convalescents. Its doors are naturally closed to students, for the younger students have been sent into the army as nurses, and the oldest have taken an emergency medical examination and gone with the troops as assistant surgeons. Moreover, medical students from civil life who have almost completed their studies have been permitted to dispense with the medical examination. In this way the number of physicians available for military service has been increased.

Thanks to the recognized excellent organization of our military sanitary service, the hope may be entertained that the fearful horror of war, so far as regards the wounding of soldiers, will be mitigated so far as possible. Further, from the same reason, we may hope that the epidemic diseases which in former wars have swept away as many or more persons than have fallen on the field of battle, will be excluded, not only from the army, but also from the civil population. That there is danger in this respect has become known to us by a report from Russia where, already for many weeks, cholera is said to be demanding not a few victims in various districts. Even an invasion of St. Petersburg by the plague has been feared.

MEDICAL AND SANITARY AFFAIRS IN VERA CRUZ

(From Our Special Correspondent)

VERA CRUZ, MEXICO, Aug. 28, 1914.

The hot season, which is also the rainy season, begins in Vera Cruz in May or June and lasts until the end of September, and as the season advances the tendency is for the death and morbidity rates for all diseases to increase, due to the heat itself, and the rapid increase in the amount of malaria; yet thanks to the effective work of our sanatoriums, this year is an exception, in that the civil death-rate for July is practically no greater than for June, in which month it was lower than the average.

The civil death-rates per thousand of population, per annum, for the months of June and July for the past five years for the city of Vera Cruz are given below; the improvement for July of this year is too great to be accidental or due to anything but improved sanitation.

	June	July
1910.....	36.86	46.86
1911.....	38.29	46.86
1912.....	44.86	49.72
1913.....	36.86	41.15
1914.....	32.00	32.58

A comparative statement of the civil deaths from communicable diseases for June and July of this year is as follows:

Civil Deaths from Communicable Diseases for June and July, 1914

	June	July
Typhoid fever	1	0
Malaria	8	2
Small-pox	4	1
Dysentery	12	4
Tuberculosis	19	26
Diarrhea and enteritis, under 2 years	19	14
Diarrhea and enteritis, 2 years and over	28	23

The increase of deaths from tuberculosis is not unusual during the hot weather; the small-pox epidemic is over and there are now no cases in the city; between May 18 and July 31, 66,432 persons were vaccinated; revaccinations are now being made when indicated but general vaccination ceased with the end of July. The principal gain is due to the fall in the death-rates for malarial and intestinal diseases and this improvement is directly due to our preventive measures.

The antimalarial measures which affect the civil population are three: the suppression of mosquito breeding, the use of the Army laboratory in establishing the correct diagnosis, and the following up and treatment of all proved carriers of gamets in the blood. Mosquito-breeding has been largely suppressed by the extensive and intricate system of ditches in the environs of the city, totaling about 25 miles in length; miles of vacant lots and hundreds of acres of swamp at the bases of the gigantic sand-dunes behind the city have been drained by the Health Department, and it is now possible to

sleep comfortably in almost all parts of the city without the use of mosquito-bars, something heretofore unknown at the height of the rainy reason.

Malaria has been made a reportable disease by the Health Department and demonstration of the parasite in the blood is insisted on as far as possible. All houses where proved cases of malaria have occurred have been visited by inspectors trained in mosquito extermination, and secondary cases have been so far practically unknown. As a result of a partial malarial survey of the city, it has been found that the disease is principally localized along the railroad and the railroad yards. Further investigations along this line are now under way. The work has advanced far enough to demonstrate that there is very much less malaria here now than is usual at this time of the year; the Mexican physicians are unanimous in stating that the amount of *paludismo* is now very small.

The other group of diseases which have been brought under control are the dysenteries and diarrheas, and the preventive measures which seem to be directly responsible for the improvement are the following: the suppression of flies and the protection of foodstuffs in the markets by screening; the improvement in the milk-supply; and disinfection and isolation of dysenteric cases. The number of milk-venders in the city is approximately 150, and 200 samples of milk have been examined for dirt, adulteration and the percentage of fat. The milk examinations are made at irregular intervals on unannounced dates, each vender's milk being examined at least quarterly. The measure, however, which seems most directly responsible for the diminution in the number of cases and deaths from intestinal diseases is the antifly campaign. The city water has been frequently examined in the laboratory and found uniformly good. No cases of yellow fever have originated here or been brought to the port.

The health of the troops has remained excellent, the sick-rate being only 2 per cent. from all causes, or rather less than at most garrisoned posts in the United States. Surgical cases during June and July were few, accidents and injuries, 10 cases; appendicitis, 9 cases; Hagner's operation in about 15 suitable cases has given splendid results. Dysenteries, both bacillary and entamebic have practically disappeared; in May there were 16 cases, in June, 12, in July, 2, and so far in August, 1; the only fatality occurred in May.

Malarial diseases have increased moderately; in May there were 3 cases, in June, 19, in July, 24, and in the first twenty days of August also 24. There have been no fatal and very few severe cases among the troops, since they receive early and proper treatment. Deaths among Mexicans, especially of the poorer classes, have not been infrequent during August of previous years; one Mexican physician of good standing states that ordinarily in August and September, every physician in the city may have 4 or 5 pernicious cases each day, with a high percentage of deaths. The fatalities, they state, are distinctly less since the hypodermic use of quinin has become common. They use 15 grains of quinin bichlorid in 1 c.c. of sterile water; each dose being prepared ready for use in sterile glass ampules. The injection is given deeply into the muscles, care being taken to avoid deposits of fat; abscesses do not follow unless the dose be given into the subcutaneous or fatty tissue. Fatal cases among Mexicans this year are few, and have occurred only among the very poor and ignorant.

The malarial season, beginning in May, lasts to the time of the "northers," cold gales out of the north, which begin to blow toward the end of September. We have, therefore, to look forward to at least a month more of malaria; in fact the worst part of the year is yet to come. The number of cases among both Mexicans and Americans has been kept down to a degree heretofore unattained and every effort is being exerted to exterminate the disease. As it is, many of our cases are imported, and come from localities not under our control. There is no doubt but that the malarial sick-rate of Vera Cruz can be lowered more and more each year, but to accomplish it will require time, brains and money.

No doubt Northern travelers have often wondered why the inhabitants of tropical cities live huddled together in compactly built towns, whose narrow streets are utterly devoid of shrubbery and shade trees. To one who has made a malarial survey of such a town, locating each case on a spot map, the reason is evident, for malaria creeps in through the outskirts of the city from all sides, and does not cease its advance until the older, more densely built portion of the city is reached.

Marriages

HYMAN ISAAC GOLDSTEIN, M.D., Camden, N. J., to Miss Evelyn Lipitz of Vineland, N. J., at Atlantic City, N. J., September 8.

JOHN LADA MILLER, M.D., Alliquippa, Pa., to Miss Florence Nellie Molter of Warrendale, Pa., at Suterville, Pa., August 27.

THOMAS JOSEPH HOULIHAN, M.D., Ida Grove, Iowa, to Miss Gertrude Masterson of Chicago, at Sioux City, Iowa, August 24.

CARL EDWARDS, M.D., Wade, Ohio, to Miss Iva Keller of New Matamoras, Ohio, at Marietta, Ohio, August 20.

ARTHUR MONROE CALVERT, M.D., Lawrence, Ind., to Miss Anna May Gorby of Indianapolis, September 5.

ALBERT HORR MONTGOMERY, M.D., Chicago, to Miss Elizabeth Russell of Tulare, Cal., August 22.

THOMAS J. W. SHOEMAKER, M.D., to Miss Blanche Papanek, both of Fort Worth, Texas, August 15.

FREDERICK J. ROOST, M.D., Sioux City, Iowa, to Miss Helen Kearney of Jackson, Neb., August 29.

HAROLD H. MEREDITH, M.D., to Miss Mary Adel Palmer, both of Montrose, Colo., August 15.

CYRIL E. SHEPPARD, M.D., Larned, Kan., to Miss Helen Smith of Baldwin, Kan., August 17.

GLENN ORVILLE DAYTON, M.D., Butte, Mont., to Miss Sylvia Magina of Chicago, September 1.

Deaths

George Banghart Henry Swayze, M.D. Jefferson Medical College, 1859; one of the founders and first dean of the faculty of the Medico-Chirurgical College of Philadelphia; assistant surgeon of the One Hundred and Seventy-Eighth Pennsylvania Volunteer Infantry during the Civil War; afterward editor of a weekly newspaper in Mahanoy City, Pa.; died at his home in Philadelphia, August 22, from senile debility, aged 81.

John R. Umstad, M.D. Jefferson Medical College, 1876; a Fellow of the American Medical Association and a specialist on diseases of the eye; surgeon on the staff of the Charity Hospital, Norristown, Pa.; and for many years coroner's physician of Montgomery County; died at his home in Norristown, August 26, from typhoid fever, aged 58.

Charles T. Race, M.D. Tulane University, New Orleans, La., 1882; a member of the State Medical Association of Texas; for more than thirty years a resident of El Paso, Texas; and since 1885 an official of the city health department; assistant city health officer of El Paso; died at his home in that city; May 8, aged 62.

James B. Garvey, M.D. College of Physicians and Surgeons, Baltimore, M.D., 1884; a Fellow of the American Medical Association; for four years sheriff of Calaveras County, Cal., and for two terms superintendent of schools; died at his home in Dunmore, Pa., August 23, from acute gastritis, aged 71.

Arthur Wesley Hammer, M.D. Northwestern University Medical School, Chicago, 1911; formerly of Arbuckle, Cal.; was found dead in the bathroom of his apartment in Chicago, August 30; it is believed from water gas asphyxiation, aged 32.

Jasper T. Englerth, M.D. Physio-Medical College of Indiana, Indianapolis, 1879; physician to the German Baptist Old Folks' Home and Orphanage; died at his home in Honey Creek, Ind., August 12, aged 61.

Frederick C. Beals, M.D. University of Buffalo, N. Y., 1875; a Fellow of the American Medical Association and health officer of Salamanca, N. Y.; died at his home in that city, July 25, aged 62.

Leonard H. Spalding, M.D. University of Maryland, Baltimore, 1869; for thirty-three years a practitioner of Peoria, Ill.; died in Rochester, Minn., August 22, from heart disease, aged 69.

Henry Redlich, M.D. Rush Medical College, 1883; a member of the Illinois State Medical Society; died at his home in Chicago, August 30, aged 82.

William H. Person, M.D. Jefferson Medical College, 1877; a member of the Nebraska State Medical Association and for a quarter of a century a leading practitioner of the Elkhorn Valley; died at his home in Stanton, Neb., August 12.

Thomas Warren Moore, M.D. University of Pennsylvania, Philadelphia, 1869; a member of the State Medical Association of Texas; died at his home in Seguin, Texas, August 19, from cerebral hemorrhage, aged 68.

Robert Francis Gibson, M.D. Harvard Medical School, Boston, 1901; a Fellow of the American Medical Association; of West Somerville, Mass.; died at Hill, N. H., August 16, from heart disease, aged 41.

Samuel Alexander Nicholson, M.D. College of Physicians and Surgeons, Boston, 1904; a lecturer in his Alma Mater; died at his home in Bradford, Haverhill, Mass., August 18, from heart disease, aged 40.

Oliver J. Rowland, M.D. Long Island College Hospital, Brooklyn, 1899; a member of the State Medical Association of Texas and a resident of Sealy, Tex.; died in Boston, Mass., July 17, aged 38.

Ruth Bryant Leake, M.D. University of Michigan, Ann Arbor, 1891; for many years a member of the staff of Battle Creek Sanitarium; died at her home in Asheville, N. C., August 12, aged 58.

Thomas Joseph Murphy, M. D. College of Physicians and Surgeons, Baltimore, Md., 1899; a member of the Maine Medical Association; died at his home in Bangor, Maine, August 14, aged 41.

Uriel S. Wright, M.D. Washington University Medical School, St. Louis, 1871; a member of the Missouri State Medical Association; died at his home in Fayette, Mo., August 15, aged 67.

Patrick H. Mangan, M.D. Kentucky School of Medicine, Louisville, 1903; for ten years a practitioner of Central Falls, R. I.; died at his home in South Attleboro, Mass., August 12, aged 41.

Gustave F. Walker, M.D. Eclectic Medical Institute, Cincinnati, 1872; for nearly forty years a practitioner of New Orleans, died at his home in that city, August 15, aged 73.

John H. Murphy, M.D. Eclectic Medical Institute, Cincinnati, 1875; for seventeen years a resident of Fort Worth, Texas; died at his home in that city, August 18, aged 78.

Clarence K. Alger, M.D. Temple University, Philadelphia, 1909; a Fellow of the American Medical Association; died at his home in Swarthmore, Pa., August 16, aged 45.

John A. Parkison, M.D. Jefferson Medical College, 1868; surgeon of volunteers during the Civil War; died at his home in North Athens, Tenn., August 17, aged 72.

Ira Zeno Plunkett, M.D. Marion-Sims College of Medicine, St. Louis, 1896; died at his home in Lewis, Iowa, August 13, from cirrhosis of the liver, aged 38.

Grant Safely, M.D. Colorado School of Medicine, Boulder, 1900; of Yreka Cal.; was killed in an automobile accident, near Galt, Cal., August 11, aged 42.

Joseph A. Utter, M.D. Pulge Medical College, Cincinnati, 1885; died at his home in Crawfordsville, Ind., August 19, from angina pectoris, aged 67.

Lee E. Monroe, M.D. Washington University, St. Louis, 1881; died at his home in Eureka, Mo., August 16, from cerebral hemorrhage, aged 55.

Thomas J. Watlington, M.D. Jefferson Medical College, 1857; died at his home in New Boston, Tex., May 26, from senile debility, aged 84.

Nathaniel P. Ward, M.D. Rush Medical College, 1894; died at his home in Saybrook, Ill., August 20, from pernicious anemia, aged 50.

Matthew James Glass, M.D. Trinity Medical College, Toronto, Ont., 1887; died recently at his home in Poplar Hill, Ont., aged 65.

George Nelson Dolbeck, M.D. Hahnemann Medical College, Philadelphia, 1895; died at his home in New York City, July 29.

Marshall Camp, M.D. University of Iowa, Iowa City, 1891; died at his home in Decatur, Iowa, August 14, aged 60.

William H. McConnell, M.D. Jefferson Medical College, 1857; died at his home in Brimfield, Ohio, July 24, aged 83.

Jennie E. Smith, M.D. Chicago Homeopathic College, 1879; died at her home in Chicago, August 20, aged 79.

Edward Thomas, M.D. Rush Medical College, 1860; of Scottville, Mich.; died in Manistee, Mich., August 17.

The Propaganda for Reform

IN THIS DEPARTMENT APPEAR REPORTS OF THE COUNCIL ON PHARMACY AND CHEMISTRY AND OF THE ASSOCIATION LABORATORY, TOGETHER WITH OTHER MATTER TENDING TO AID INTELLIGENT PRESCRIBING AND TO OPPOSE MEDICAL FRAUD ON THE PUBLIC AND ON THE PROFESSION

WINE OF CARDUI

The Journal is Sued and the Company is Reported to Be Soliciting Testimonials from Doctors

The manufacturers of "Wine of Cardui" have entered suit against the American Medical Association and the editor of THE JOURNAL for $300,000.00, presumably for the article regarding this product which appeared recently in THE JOURNAL. We say "presumably," as no details are yet to hand regarding the exact nature of the suit.

In this connection, some interesting data have just been received which we give to our readers in detail. In brief, it appears that the Chattanooga Medicine Company, which manufactures Wine of Cardui, has an agent, or agents, in the field whose purpose it is to obtain testimonials from physicians regarding the alleged value of its nostrum. According to a letter, which we reproduce below, the doctors are approached and the statement is made that his opinion and expert testimony is desired in support of the company's product. Our correspondent says, further that the physician is told that a retainer will be given for his services and that he will be paid $25 a day and expenses if he will favor the company by going before its attorney and making a deposition and, furthermore, that if his services as an "expert" at the Chicago trial should be needed, the company is prepared to pay $50 a day for his services.

Our correspondent's letter detailing the attempts of the concern to obtain testimony of this sort, follows. Names, dates and places have been omitted for obvious reasons:

To the Editor: According to the statement of an agent of the Chattanooga Medicine Company who approached doctors of ——— for the purpose hereinafter stated, that company, anent recent articles concerning Wine of Cardui published in a "Chicago paper," has brought suit for damages against that publication. The words "Chicago paper" were his own; as you will learn, particular pains were taken to conceal the fact that THE JOURNAL of the American Medical Association was the "paper" in question.

The mission of this man, according to his own account, was to secure material with which to bolster this suit. The method the Chattanooga Medicine Company is pursuing through him for the prostitution of medical men in Tennessee and Alabama to that end may be of interest to you.

Through the kindness and cooperation of Dr. ——— of this place, as well as Drs. ——— and ———, and Mr. ———, a local druggist, I have been able to collect the information given here. Affidavits as to any part or all of it will be furnished, if desired, by the gentlemen concerned.

Through the kindness of the druggist mentioned above I was informed of the activity of Mr.———, the agent in question. While seeking to "get a line" on local physicians, he told the druggist of his plans and way of working. He vouchsafed the information that he was to employ ten doctors in Alabama and ten in Tennessee as experts for his company; also the fact that he paid each a retainer for his immediate services in signing a certain paper.

On investigation, I found that he had seen two of the three medical men he had decided on as prospects, and had been peremptorily dismissed before getting well launched into his argument. Fortunately, Dr. ———, the third "prospect" was warned that he was marked for a visit. After consulting an attorney, it was decided, in order to learn at first hand the agent's methods, and to secure, if possible, a copy of the paper mentioned above, that the doctor, when approached, should guardedly encourage the gentleman to divulge his offer in full. This was done.

Only pertinent details of the conversation of the first interview are given below; these are just as set down at the doctor's dictation immediately afterward.

AGENT: "Doctor, ———— is my name. I am representing the Chattanooga Medicine Company. To state my business briefly, I will say that we are instituting a suit against a Chicago paper which recently made a vicious attack on one of our preparations, Wine of Cardui. At that time it was claimed that Wine of Cardui is freely drunk as booze in the South; also that the women of the South are rapidly being made drunkards by its use. Now, Doctor, we do not believe this to be true. We wish to defend the fair name of southern womanhood from this libel, and in doing so, our product as well. To support us in this suit we want your opinion and expert testimony. You are familiar with Wine of Cardui, I presume, Doctor?"

DR. ————: "Yes."

AGENT: "Do you believe what the paper says?"

DR. ————: "What you have repeated? No, I do not!"

AGENT: "Have you prescribed Wine of Cardui?"

DR. ————: "No."

AGENT: "Have you had opportunity to observe its therapeutic action?"

DR. ————: "Daily."

AGENT: "Is it your opinion, Doctor, that the therapeutic action of Cardui on the female generative organs is due to the alcohol it contains?"

DR. ————: "The alcohol in Cardui, in the prescribed dose, or in any dose, would not, so far as I know, have any special action on the uterus or appendages."

Gratified that no explosion had occurred so far, and beginning to feel sure of his ground, the agent warmed to his task. The physician was here treated to some specious but skilful flattery, which, being irrelevant, we do not give. The doctor was finally asked directly what he thought of the attack on Cardui. He responded: "It sounds interesting."

AGENT: "As I stated at the start, Doctor, it is our desire to retain you as an expert. [Producing a paper.] A retainer will, of course, be paid for your services now. I have here a paper which will give you a good idea of the kind of certificate we want to get. To save trouble, many doctors use it as a guide to go by in writing out their own."

The doctor took the paper and kept it. A copy of this document is enclosed. We have the original. [See "Specimen of Certificate Wanted," below.]

AGENT: "We will, if you will so favor us, require you to go before our attorney and make a deposition as to your belief in the things here set down; that will be better. We will pay you $25 a day and expenses if you will do this. Also, later, it is likely we will need your services as an expert at the Chicago trial. We are prepared to pay you $50 a day and expenses for this service."

DR. ————: "But I told you at the start that I had never prescribed Cardui; that I have never observed therapeutic effects that could be attributed to it. If that was the case with a doctor who went to Chicago in your behalf, what could he say that would be of benefit to you?"

AGENT: "That will be all right, Doctor; our attorneys will furnish you the testimony."

At this point the doctor excused himself, promising an audience the next day. I was present at that time. The agent was asked on this occasion what paper was being sued—this question had been purposedly withheld before. He did not know. However, being pressed, he finally admitted that he thought it was a journal, possibly a medical journal. The two issues of THE JOURNAL in question were thrust before him. He admitted those contained the articles. His confusion was pitiful.

————, M.D., ————.

SPECIMEN OF CERTIFICATE WANTED

I have practiced medicine for eleven years, and during that time I have frequently prescribed Cardui for women suffering from menstrual disorders with beneficial results.

I have had patients under my care who have been using Cardui, and I have noticed good results from its use. (Description of symptoms may be inserted here.)

I am positive that the therapeutic results obtained by the use of Cardui are not due to the small amount of alcohol contained in each dose.

I have known of the reputation of Wine of Cardui for many years and know it to be good.

In all my experience as a physician I have never known of the use of this medicine as a beverage.

————M.D.

Graduate of ———— Medical College, ————, 19——.

Some Resolutions

In view of the statements given by our correspondent, the following resolutions recently adopted by the Medical Society of Limestone County, Alabama, are of interest:

RESOLUTIONS BY THE MEDICAL SOCIETY OF LIMESTONE, COUNTY, ALABAMA

Resolved, That we, members of the Medical Society of Limestone County, Alabama, being present at a regular meeting, and constituting a quorum, do hereby express our disapproval and condemnation of the methods being pursued by the Chattanooga Medicine Company in order to secure material from physicians to be used in a suit for damages against THE JOURNAL of the American Medical Association. Be it further,

Resolved, That we regard as reprehensible the efforts made by their representative, when approaching physicians on the subject, to conceal the identity of the publication being sued. Be it,

Resolved furthermore, That we regard the offer of a sum of money as a retainer to physicians besought to act in the alleged capacity of experts for the company, together with certain sums of money for certificates, depositions and testimony in favor of the said company, as nothing more or less than a technical and legal subterfuge in attempting to bribe and corrupt the members of the medical profession; this offer is so regarded because of the action mentioned in Resolution Two of these resolutions, as well as the fact that local members of the profession have been offered money to sign certificates, and to make depositions certifying facts which they had previously stated to the representative of the Chattanooga Medicine Company, making the offer they did not believe, and in some instances had plainly represented to him as being without the bounds of truth. Lastly, be it

Resolved, That the secretary of this society be authorized to attach to these resolutions the seal of the society; that they be spread on the minutes, and that a copy of the said resolutions be sent THE JOURNAL of the American Medical Association, to neighboring medical societies and to the chairman of the state board of censors.

J. S. CRUTCHER, President.
A. L. GLAZE, JR., Secretary and Treasurer.
J. F. HUGHES,
C. O. KING,
D. G. ESTES,
B. S. PETTUS, County Health Officer.
J. A. PETTUS,
J. H. MAPLES.

ANGIER'S EMULSION

Report of the Council on Pharmacy and Chemistry

Angier's Emulsion is essentially a petroleum product. When it was first put on the market commercial interests had been fostering the idea that petroleum products had food-value, and the manufacturers of Angier's Emulsion, making use of the idea, advertised it as a "food-medicine" and an "ideal substitute for cod-liver oil." The impression thus created has been kept alive through persistent advertising in spite of scientific proof to the contrary. To-day many who know that petroleum products have no food-value are still likely unconsciously to class Angier's Emulsion among nutrients. Although the manufacturers now advertise this product as "purely mechanical in its action," they yet show a disposition to profit by the old misapprehension, since, so far from expressly disavowing the old claims as erroneous, they mingle with the new ones vague claims of "tonic and reconstructive merits" apparently designed to sustain, in those who do not take time to consider the evidence carefully, the old faith in the claimed nutritive qualities of the preparation.

While the Council judges a preparation by the claims made for it at present, and not by any past misstatements when these have been thoroughly corrected, the past advertising of Angier's Emulsion so instructively illuminates the scientific worthlessness of proprietary therapeutic claims in general, and the whole course of its history is so typical that the referee has thought it well to review the subject briefly. The Council has authorized the publication of the following report.

W. A. PUCKNER, Secretary.

Angier's Petroleum Emulsion was brought out in 1881—that is to say, before the food-value of petroleum products had been experimentally disproved. Its advertising history

well illustrates the weed-like vitality of a financially profitable therapeutic fallacy. The shifting claims made for this preparation are such good examples of the generally unreliable therapeutic pretensions of proprietary medicines—whether of the "patent medicine" or of the "ethical proprietary" type—that it has been deemed advisable to present a brief review of the conflicting claims made for it at various times.

A PETROLEUM PRODUCT

Angier's Emulsion is described by the manufacturers as containing, in addition to "our specially purified Petroleum," "the combined hypophosphites of lime and soda, chemically pure glycerine, and the necessary emulsifying agents." So far as the hypophosphites are concerned, it is probably unnecessary to remark that the latest researches bring to light no evidence that they influence metabolism in the slightest degree. The Angier Chemical Company apparently accepts this view, for in its advertising stress is laid exclusively on the merits of the emulsion as a petroleum product. It is therefore proper to consider it from this point of view.

The history of the internal use of liquid petrolatum was sketched in a recent Council report.[1] As mentioned at that time, a number of petroleum products were put on the market some thirty years ago as substitutes for lard and butter. Contemporary opinions regarding the food value of such products differed widely.

There never was any scientific evidence to support the view that petroleum and its derivatives are assimilable by the animal organism. In fact, so far as we can learn, there was no scientific investigation of the problem until Randolph's experiments in 1884. These were probably the first to demonstrate the non-absorbability of petroleum and its valuelessness as a foodstuff.

In 1899 Robert Hutchison conclusively demonstrated by experiment that petrolatum, paraffin and related products were absolutely unassailable by any of the digestive fluids, and therefore could not possibly have any food value. Various investigators later confirmed these findings.

FIRST ADVERTISED AS A "FOOD-MEDICINE"

Let us now take up the advertising history of this nostrum. In 1895 it was sold under these claims:

". . . a 'Food-Medicine' that is far more than a substitute for cod-liver oil";
". . . a Food-Medicine that is readily assimilated and helps to digest other foods."

In 1897 it was an:

"Ideal Substitute for Cod Liver Oil."

In 1899 it:

". . . conserves heat and energy by furnishing more material for oxidation."

In 1902 it:

". . . supplants tissue waste by tissue reconstruction."

The promoters of Angier's Emulsion thus for some time ignored the status definitely assigned to petroleum products by the experiments of Randolph, Hutchison and others. This was only natural. If petrolatum was absolutely inert in the alimentary canal (and this was now proved beyond controversy) then an emulsion prepared from it most certainly was not a "food-medicine," could not "supplant tissue waste," or "conserve heat and energy." All the credit which previous "unterrified and ingenious advertising" (to quote Hutchison) had accumulated for Angier's Emulsion was bound up with the view that petroleum products were foodstuffs.

LATER ADVERTISED AS NON-ABSORBABLE

The non-absorbability of liquid petrolatum, however, suggested to Robinson, Schmidt, Lane and others, a new therapeutic use for it in the treatment of chronic constipation. This method has rapidly gained popularity and it is not surprising, therefore, that the promoters of Angier's Emulsion changed their claims accordingly, and now began to base their advertising chiefly on the proved properties of petrolatum. In 1910 the emulsion was advertised for the treatment of chronic diarrhea on these grounds:

". . . given by the mouth, it passes to the lowermost portions of the intestines without changing its identity; hence it exerts antiseptic, soothing and demulcent properties upon every inch of the intestinal tract, from the duodenum to the rectum."

The old claims, however, were not discarded altogether, for in 1911 the preparation was recommended for children's diseases as:

". . . an aid to appetite and digestion and a splendid tonic and builder."

Before long the attempt was made to weave together the claims based on opposed and mutually incompatible properties. In 1912 we find Angier's Emulsion recommended because it:

". . . corrects digestive disturbance and promotes normal action of the bowels. At the same time it has a most invigorating tonic influence upon the general health."

In 1914 medical men are advised through the advertising pages of the *British Medical Journal* of the:

". . . tonic and reconstructive merits of Angier's Emulsion."

A pamphlet on "Constipation," which is "Presented to Physicians with Compliments of the Angier Chemical Company" (copyright, 1913; still distributed in 1914) informs physicians that Angier's Emulsion is:

". . . purely mechanical in its action."

Notwithstanding this, we are told later on in the same pamphlet that it:

". . . facilitates, hastens and assists the processes of digestion and assimilation." . . . "is a most efficacious remedy in Pulmonary Tuberculosis because it not only maintains normal nutrition, but also exerts a well-defined specific palliative influence upon the cough and other symptoms of the disease."

Evidently the advertisement is written in the hope that in one paragraph a claim based on the proved properties of petroleum products may be substantiated, while in another a totally different and inconsistent claim may be glibly insinuated in vague phrases designed to lull thought and thus perform the remarkable feat of securing credence for two contradictory statements.

UNWARRANTED AND MISLEADING CLAIMS

Further evidence that Angier's Emulsion is at present exploited both to the medical profession and to the public under claims that are unwarranted and misleading, if not as palpably untrue as the claims made in the past, is found on the wrapper of a trade package purchased in 1914 and in the circular accompanying it. Note the following:

"Indicated in Diseases of the Throat and Lungs and of the Digestive Apparatus. Useful in General Debility and Wasting Diseases, Especially when due to Faulty Nutrition. The antiseptic properties of the Emulsion particularly adapt it to the treatment of diseases of septic or bacterial origin."

"Angier's Petroleum Emulsion is indicated in affections of the throat, lungs and intestinal tract—both subacute and chronic. In diseases of the digestive apparatus due to catarrhal, ulcerative or tuberculous conditions, its peculiar soothing, healing and aseptic properties make its use especially beneficial. Wasting diseases, particularly when due to faulty nutrition, are greatly benefited by its use, one of the most noticeable effects being a prompt and decided increase in weight."

It is, of course, unnecessary to point out that, since petroleum is non-absorbable, Angier's Emulsion contains no ingredient capable of affecting the respiratory mucous membrane except by local application, for which, indeed, this preparation is evidently not intended.

COMPOSITION AND FORMULAS

According to a circular which was contained in a trade package recently purchased

"Each fluidounce of Angier's Petroleum Emulsion with hypophosphites contains: 33⅓ per cent. of our specially purified Petroleum; 9 grains of the combined hypophosphites of lime and soda, chemically pure glycerin and the necessary emulsifying agents."

1. Liquid Petrolatum or "Russian Mineral Oil," Propaganda Department, THE JOURNAL A. M. A., May 30, 1914, p. 1740.

As regards the nature of the product referred to under the indefinite term "petroleum" the circular states that Angier's Emulsion is:

". . . prepared with refined petroleum specially purified for the purpose. By a process peculiarly our own the crude petroleum, obtained from special wells is so purified that all taste and odor and all objectionable and irritating properties are removed, while the full medicinal value of the oil is retained. . . ."

The composition assigned to Angier's Emulsion in an advertising pamphlet "The Petroleum Idea," issued in 1907 differs in that it is said to contain "specially purified crude petroleum" and that each fluidounce is said to contain 2.84 grains of benzoate of sodium. While these quotations convey the impression that certain medicinal constituents of the "specially purified" product obtained from "special wells" are "retained," a pamphlet recommending the use of Angier's Emulsion for the treatment of constipation assures us that it produces the "mechanical effects of the purest petroleum" and that it is "purely mechanical in its action."[2]

LABORATORY REPORT

The statements regarding the identity of the "petroleum" are so unsatisfactory and contradictory (in one place "refined petroleum specially purified for the purpose," in another "specially purified crude petroleum"—in one place "medicinal" and in another "purely mechanical in its action") that the help of the Chemical Laboratory of the Association was invoked to establish the character of the petroleum product and to determine the presence or absence of sodium benzoate, at one time declared by the manufacturers to be present but later omitted from the formula. The Association's chemists reported:

"From a specimen of Angier's Emulsion recently purchased there was separated by the customary methods of analysis, a yellow fluorescent, unsaponifiable, semi-solid residue which has all the properties of ordinary yellow petrolatum of a consistence somewhat softer than the product described in the Pharmacopeia. It was much more dense than the colorless, non-fluorescent liquid petrolatum now in vogue as a laxative. The preparation contained benzoate, both in the form of free benzoic acid and also in the form of a water-soluble salt probably sodium benzoate."

The petroleum product contained in the emulsion was thus shown to be intermediate between the ordinary (solid) and the liquid petrolatum. It also appears that a benzoate is still present, though no longer mentioned in the formula.

2. As is the custom in the exploitation of proprietary medicines, the preparation which is the firm's main output—the leader—is made to do duty as an advertising medium for auxiliary preparations. Thus the Angier Emulsion booklet advises the use of Angier's Throat Tablets. These tablets are alleged to be composed essentially of elm bark and petroleum, are claimed to "promote appetite and aid digestion," and it is stated that "their healing action on all mucous surfaces makes them decidedly beneficial, not only to the pulmonary tract but on the digestive areas as well." Angier's Throat Tablets were examined in the Association's Laboratory to determine the amount and kind of petroleum present in the tablets. Extraction of the tablets with ether yielded a petroleum product which resembled in every way the product obtained from the emulsion. Slightly less than 12 per cent. of the tablet was composed of the petroleum oil. The part insoluble in ether appeared to consist essentially of elm bark, with gum and sugar.

The Laboratory and the Clinic.—There are few more significant principles contributing to form the substratum of good and successful work at the bedside than a just estimate of the correct relationship between clinical and experimental work, and lack of the requisite clearness of mental vision in this matter is, I believe, one of the most potent causes of unexplained disappointment and failure. We sometimes observe a man of high intellectual power, honest, painstaking and industrious, who seems to fail unaccountably, and by that I do not mean in respect of wordly advancement and public estimation, but he fails in the actual practice of his profession at the bedside. If I were asked to state in general terms what in my opinion is the most frequent defect that underlies this regrettable phenomenon, I should reply without hesitation, "Inability to distinguish clearly between the teachings of the laboratory and those of the bedside"—R. Hamilton Russell. *British Medical Journal.*

Queries and Minor Notes

Anonymous Communications and queries on postal cards will not be noticed. Every letter must contain the writer's name and address, but these will be omitted on request.

DISINFECTION OF LIBRARY BOOKS

To the Editor:—1. Can books, say of the circulating department of a public library, be properly disinfected? If so,

2. What is the best method?

3. What would you do with public library books used in families in which there is an open case of tuberculosis (pulmonary) (*a*) disinfect them, (*b*) destroy them, and deny family further privileges of the library?

4. Have you any suggestions on this important question of disseminating disease by means of schoolbooks and books of circulating departments of public libraries?

J. Vander Laan, M.D., Muskegon, Mich.

Answer.—1. Yes.

2. The best disinfecting agent is formaldehyd gas, and the books should be thoroughly opened. They should be arranged on perforated wire trays and exposed to the gas for twelve hours at a temperature of 80 C. (176 F.). When only a few books are to be treated, in the absence of a special apparatus, they may be disinfected by placing two or three drops of a 40 per cent. solution of formaldehyd on every second page. The book is then laid in a closed box or barrel in which more formaldehyd solution has been sprinkled and left in a warm place for not less than twenty-four hours.

3. Tuberculosis is not usually regarded as sufficiently contagious to necessitate the disinfection of books. Without doubt, however, a sufficient degree of safety can be attained by disinfection without denying the tuberculous patient and family the privileges of the library.

4. See The Journal, April 20, 1912, p. 1201.

The danger of infection of any sort being conveyed by books is very slight. If the books are kept out of circulation for a short time or simply filled with formaldehyd, if they must be "disinfected," no one need fear that books will be much of a factor in disseminating disease.

ANTISEPTIC ACTION OF HEXAMETHYLENAMIN

To the Editor:—Please let me know whether an article was published in The Journal a few years ago, stating that as a result of experiments carried on, it was found that hexamethylenamin was an antiseptic independent of its formaldehyd content.

S. W. Marick, M.D., Pittsburgh.

Answer.—Such an article has not been published in The Journal within the last five years. In an abstract of an article by L. B. Wiggs, entitled "Pharmacologic and Clinical Aspects of Hexamethylenamin" (*Southern Medical Journal*, December, 1910, abstracted in The Journal, Jan. 14, 1911, p. 152) it is stated that "the drug—as such—has only mild antiseptic properties and is probably, in part at least, absorbed unchanged." A statement was made in Queries and Minor Notes (The Journal, May 18, 1912, p. 1527) to the effect that hexamethylenamin in itself is somewhat antiseptic, but not markedly so. At that time it was believed that hexamethylenamin broke up in the tissues, liberating formaldehyd, and the answer to the query referred to held that the statement that "its value lies in the fact that it breaks up in the tissues and thus formaldehyd is liberated, is fully justified." In an editorial, July 6, 1912, page 38, it is said that "the theory of its (hexamethylenamin's) action centers in the liberation of formaldehyd from the compound on treatment with acid." It appears that the opinion that hexamethylenamin is antiseptic independently of the liberation of formaldehyd was an assumption not founded on reliable experimental evidence. The recent investigations of Burnam, Hanzlik and others have shown that its action as an antiseptic depends on the decomposition into formaldehyd and ammonia, which occurs only in an acid medium.

ORIGIN OF THE NAME "WALDEYER'S RING"

To the Editor:—Please give the origin of the name "Waldeyer's ring" as applied to the pharyngeal, faucial and laryngeal tonsils.

J. W. D.

Answer.—This name was given in honor of the German anatomist, Heinrich Wilhelm Gottfried Waldeyer, born in 1836.

Medical Education and State Boards of Registration

COMING EXAMINATIONS

COLORADO: Denver, October 6. Dr. David A. Strickler, Empire Bldg., Denver.
DISTRICT OF COLUMBIA: Washington, October 13-15. Sec., Dr. George C. Ober, 125 B. St., S. E., Washington.
GEORGIA: Atlanta, October 13-15. Sec., Dr. C. T. Nolan, Marietta.
IDAHO: Wallace, October 6. Sec., Dr. John F. Schmershall, Jerome.
ILLINOIS: Chicago, October 6-8. Sec., Dr. C. St. Clair Drake, Springfield.
KANSAS: Topeka, October 13-15. Sec., Dr. H. A. Dykes, Lebanon.
MICHIGAN: Lansing, October 13-15. Sec., Dr. Beverley D. Harison, 504 Washington Arcade, Detroit.
MINNESOTA: Minneapolis, October 6-9. Sec., Dr. Thomas McDavitt, Lowry Bldg., St. Paul.
MISSOURI: Kansas City, September 28-30. Sec., Dr. J. A. B. Adcock, State House, Jefferson City.
MONTANA: Helena, October 6. Sec., Dr. William C. Riddell, Helena.
NEW MEXICO: Santa Fe, October 12. Sec., Dr. W. E. Kaser, East Las Vegas.
NEW YORK: September 22-25. Chief of Examination Division, Mr. Harlan H. Horner, Department of Education, Albany.
OKLAHOMA: Muskogee, October 6-8. Sec., Dr. John W. Duke, Guthrie.
RHODE ISLAND: Providence, October 1-2. Sec., Dr. Gardner T. Swarts, State House, Providence.
WEST VIRGINIA: Clarksburg, October 13. Sec., Dr. S. L. Jepson, 81 Twelfth St., Wheeling.

New York January Report

Mr. H. H. Horner, secretary of the Examination Division of the New York Education Department, reports the written examination held at Albany, Buffalo, New York and Syracuse, January, 1914. The number of subjects examined in was 8; total number of questions asked, 80; percentage required to pass, 75. The total number of candidates examined was 117, including one osteopath, of whom 73 passed, including one osteopath, and 44 failed. The following colleges were represented:

College	Year Grad.	Total No. Examined
PASSED		
University of Colorado	(1905)	1
Yale Medical School	(1906, 1); (1911, 1); (1912, 2); (1913, 1)	5
Georgetown University	(1912)	1
Johns Hopkins University	(1904, 1); (1907, 1); (1911, 2); (1912, 1)	5
Dartmouth Medical School	(1910)	1
Albany Medical College	(1912, 3); (1913, 5)	8
College of P. and S. in the City of New York	(1894)	1
Columbia Univ., College of P. and S.	(1911, 1); (1912, 3); (1913, 6)	10
Cornell University	(1911, 1); (1913, 1)	2
Fordham University	(1911, 1); (1912, 1); (1913, 4)	6
Long Island College Hospital	(1912, 2); (1913, 5)	7
New York Homeo. Med. Coll. and Flower Hosp.	(1910, 1); (1913, 1)	2
Syracuse University	(1911, 2); (1912, 3); (1913, 1)	6
University and Bellevue Hospital Med. Coll.	(1913)	6
University of Buffalo	(1912, 1); (1913, 2)	3
Jefferson Medical College	(1912, 1); (1913, 1)	2
University of Vermont	(1912)	1
Medical College of Virginia	(1911)	1
University of Toronto	(1906, 1); (1911, 2)	3
Royal Imperial University, Vienna	(1912)	1
FAILED		
University of California	(1900)	1
Yale Medical School	(1911)	1
Georgetown University	(1913)	1
George Washington University	(1905)	1
Howard University	(1902)	1
Chicago College of Medicine and Surgery	(1912)	2
College of Physicians and Surgeons, Chicago	(1902)	1
Tulane University of Louisiana	(1908)	1
Baltimore Medical College	(1913)	1
College of Physicians and Surgeons, Baltimore	(1912)	1
University of Maryland	(1911)	1
Tufts College Medical School	(1910, 1); (1913, 1)	2
Univ. of Mich. Homeo. Med. Coll.	(1911, 1); (1912, 1)	2
Albany Medical College	(1912)	1
Columbia Univ., College of P. and S.	(1913)	1
Fordham University	(1913)	2
Long Island College Hospital	(1913)	2
New York Homeopathic Medical College	(1882)	1
New York Homeo. Med. Coll. and Flower Hosp.	(1913)	1
Syracuse University	(1912, 1); (1913, 1)	2
University and Bellevue Hosp. and Med. Coll.	(1913)	3
University of Buffalo	(1913)	4
Jefferson Medical College	(1912)	2
Hahnemann Med. Coll. and Hosp., Philadelphia	(1911)	1
Medico-Chirurgical College of Philadelphia	(1912)	1
Woman's Medical College of Pennsylvania	(1912)	1
Laval University, Quebec	(1900)	1
Royal Univ. of Naples, Italy	(1897, 1); (1905, 1); (1912, 1); (1913, 1)	4
Royal University of Rome	(1910)	1

Book Notices

FEEBLE-MINDEDNESS: ITS CAUSES AND CONSEQUENCES. By Henry Herbert Goddard, Ph.D., Director of the Research Laboratory of the Training School at Vineland, New Jersey, for Feeble-Minded Girls and Boys. Cloth. Price, $4 net. Pp. 599, with illustrations. New York: The Macmillan Company, 1914.

In this book is embodied a report of the work done during the last five years in the Vineland Research Laboratory. An attempt was made to ascertain the cause of feeble-mindedness of the children in that institution. Three hundred and twenty-seven cases are reported, the research including a detailed study of the heredity as ascertained by a field investigation. The greatest stress is laid on this factor, although each case was thoroughly analyzed from every point of view. The summarized study has led the author to believe that intelligence is inherited according to the mendelian law. This conclusion is, of course, of great importance. Based on so large a series of cases as this, it must necessarily be given the most serious consideration, although this research is but preliminary to further studies along the same line. It has been done with a thoroughness which warrants a belief that future studies will have an equally valuable outcome. The cases are divided up into groups, according to various chief factors underlying the conditions in each instance. There are numerous plates illustrating the features of the different cases, and several chapters explaining the line of study followed and the reasoning process by which Dr. Goddard arrived at his conclusions. The language is simple and the diagrams extraordinarily clear.

DEFENSIVE FERMENTS OF THE ANIMAL ORGANISM AGAINST SUBSTANCES OUT OF HARMONY WITH THE BODY, THE BLOOD-PLASMA AND THE CELLS. Their Demonstration and Their Diagnostic Significance for Testing the Function of Different Organs. By Emil Abderhalden, Director of the Physiological Institute of the University at Halle. English Translation by J. O. Gavronsky, L.R.C.P., M.R.C.S., M.D., and W. F. Lancaster, M.A. Third Edition. Cloth. Price, $2.75 net. Pp. 242, with 11 illustrations. New York: William Wood & Co., 1914.

The date of translation of this edition of Abderhalden's work is Feb. 3, 1914, approximately twelve years since the beginning of the fundamental work of the author. In that period there is hardly a single branch of medicine to which the application of this method has not been made. The basic researches are the chief feature of the present volume. The technic of the test is outlined, and there is a chapter on sources of error which will aid the reader toward a greater surety that his work is worthy and reliable. How important this is may be judged from Abderhalden's statement in the preface to the effect that "every research which has not been carried out with absolutely unobjectionable technic delays our arrival at a clear appreciation of the methods." In view of the growth of the subject the author has not attempted to give a complete bibliography, but merely to list and criticize the more important papers which have been published. The time is not yet ripe for drawing final conclusions, but enough has been done to show that important advances are being made. This little guide is a valuable aid to a continuation of the early steps.

DIE OPERATIVEN ERFOLGE BEI DER BEHANDLUNG DES MORBUS BASEDOWII. Von San.-Rat Dr. Otto Klinke, Direktor der Provinzial-Heilund Pflegeanstalt in Lublinitz. Paper. Price, 4 marks. Pp. 112. Berlin: S. Karger, 1914.

In this brochure the author carefully reviews the literature of the subjects from 1880 to 1914 and divides this period into two parts, the first from 1880 to 1894, which he calls the old, and the second from 1894 on, which he calls the new. While the number of the articles reviewed is considerably over one thousand, yet the author says that it cannot be said to be exhausted in all directions. Statistics are tabulated showing the results of 6,825 operations for goiter in which Basedow symptoms were present and 8,992 operations in which Basedow symptoms were not present, making an interesting and instructive study. In the extensive bibliography

at the end, American contributions are conspicuous by their absence. In reviewing the literature in this way it is interesting to note the gradual development of the dominant present-day ideas concerning the nature of this disease and the influence which the operative treatment has had in determining them.

DIAGNOSTIC METHODS, CHEMICAL, BACTERIOLOGICAL AND MICROSCOPICAL. A Text-Book for Students and Practitioners. By Ralph W. Webster, M.D., Ph.D., Assistant Professor of Pharmacological Therapeutics in Rush Medical College, University of Chicago. Fourth Edition. Cloth. Price, $4.50 net. Pp. 738, with 208 illustrations. Philadelphia: P. Blakiston's Son & Co., 1914.

Less than a year has passed since the publication of the third edition of this work. However, through suggestions from several sources, the author has been able to add to it several subjects not previously discussed and of importance to physicians who wish to be thoroughly conversant with laboratory methods. Among them are, for example, discussions of Kowarsky's method of determining glucose in the blood; several methods for staining spirochetes in the tissues; Lange's colloidal gold test for congenital syphilis, and the newer applications of Abderhalden's method. To those familiar with the laboratory and its uses, no recommendation of this book is necessary. Physicians who desire a ready reference work for the later as well as the commonly used diagnostic methods will find it invaluable.

DENTAL JURISPRUDENCE. An Epitome of the Law of Dentistry and Dental Surgery. By Elmer D. Brothers, B.S., LL.B., Professor of Medical and Dental Jurisprudence in the University of Illinois. Cloth. Price, $2. Pp. 220. St. Louis: C. V. Mosby Company, 1914.

This is a general review and an analysis of the principles and rules of law affecting the practice of dentistry. Since dentistry is, in a sense, a branch of medicine, the laws, procedures and decisions that apply to medicine also apply to dentistry. As a matter of fact, almost all the references given in this book are to medical cases. The author has presented the subject in a concise manner, and in terms that are both clear and non-technical. It is a book that should be in the hands of every dentist, or at least of those who are not thoroughly conversant with their responsibilities under the law. And, since the matter is so near-medical, physicians will find it full of good advice and information.

Medicolegal

Strong Declaration of Liability Against Hospitals with Charitable Foundations

(*Lindler vs. Columbia Hospital of Richland County* (*S. C.*), *81 S. E. R. 512*)

The Supreme Court of South Carolina affirms a judgment for damages in favor of the plaintiff, who was burned on a hot-water bottle. The court says that this is the first case in that state on the question: Is a hospital with a charitable foundation liable to patients for injuries caused by the negligence of the employees? It has been stated that the doctrine of immunity from damage suits originally arose in cases in which hospitals were operated by government agencies. If the doctrine had been confined to its original declaration, there would have been no trouble; but, when the exempting circumstance does not exist, the immunity ought not to exist. The result of these holdings is that, when a small charitable foundation is secured, a hospital may be opened; patients secured, who go there under an invitation that promises skilled physicians, competent trained nurses; advantages promised that cannot be secured at home; then, when the patients are secured, they may be neglected, burned with fire or vitriol, put into beds from which other patients afflicted with contagious, loathsome, and it may be disgraceful diseases have been taken, and we are told that there is no remedy except to sue, though the injured party may be a poor, overworked, broken-down, friendless, helpless woman. The court is not reflecting on the defendant hospital; it is ready to believe that the injury here was simply one of those acts of inadvertence that sometimes befall the most careful of men and women. The thing against which it protests is the absolute immunity, given to all hospitals that can secure a charitable foundation, from the most brutal and inhuman treatment of those unfortunate men and women who may be carried (sometimes without their knowledge or consent) within the hospital walls, under an implied contract. Some of the cases hold that the pay patients, when they enter a hospital with a charitable foundation, are really charity patients, and the weekly sums they are required to pay are not payments at all, but contributions to the charity fund. This is brilliant, but is not convincing. This court thinks the first duty of every man and the first call on every fund is to repair the evil of its own doing, and then the remaining fund or remaining strength may be devoted to charity. The court does not think it wise or safe to allow an institution to exist with unlimited power to do evil, and make that institution powerless to repair the evil, because some good man or woman has contributed a fund and intended thereby to do good. The court knows that a trust fund cannot be diverted to a different purpose from that for which it was created; but the purpose of the trust is to relieve suffering, and not to increase it. When, in the administration of the trust, suffering is increased, the purpose fails. The courts that declare immunity are destroying and not maintaining the trust.

Conviction for Publishing Obnoxious Advertisement Affirmed

(*People vs. Kowalski* (*Mich.*), *14 W. R. 177*)

The Supreme Court of Michigan affirms a conviction of the defendant for an offense defined and made punishable by the provisions of Act 164, Public Acts of 1907, namely, that, being a duly registered practitioner in medicine, she inserted or caused to be inserted and printed in a newspaper an advertisement obnoxious to the statute. The jury were instructed that it was not necessary to find, in order to convict this defendant, that she personally went over and caused the advertisement to be inserted. It was sufficient if she caused it to be inserted either in person or by her duly authorized agent. If she was the responsible moving party, who incited or procured the publication of that advertisement, and if it was of the character penalized by the statute, namely, if it was an advertisement with reference to diseases of the genito-urinary organs, or venereal diseases, or containing obscene or offensive matter, she would be just as guilty as though she went over and put it in herself. The mere fact that she did it through somebody else, if she did it, did not relieve her from responsibility; but the jury must be satisfied, in order to convict her, that she knew it was going in, was responsible for its going in, paid for it, knowing what she was paying for. That was a correct statement of the law, which, in the language employed by the court or in some suitable language, the people were entitled to have given to the jury.

Society Proceedings

COMING MEETINGS

Amer. Academy of Ophthal. and Oto-Laryn., Boston, Oct. 19-21.
Amer. Assn. of Obstetricians and Gynecologists, Buffalo, Sept. 15-17.
American Association of Railway Surgeons, Chicago, Oct. 14-16.
American Electro-Therapeutic Association, Battle Creek, Sept. 15-17.
Association of Military Surgeons of the U. S., Cincinnati, Sept. 29-Oct. 2.
Delaware State Medical Society, Wilmington, Oct. 13-14.
Idaho State Medical Association, Boise, Oct. 8-9.
Indiana State Medical Association, Lafayette, Sept. 24-25.
Kentucky State Medical Association, Newport, Sept. 23-25.
Med. Soc. of the Mo. Valley, Des Moines and Colfax, Ia., Sept. 17-19.
Minnesota State Medical Association, St. Paul, Sept. 30, Oct. 1-2.
Mississippi Valley Med. Assn., Cincinnati, Oct. 27-29.
Nevada State Medical Association, Reno, Oct. 13-15.
New Mexico Medical Society, Albuquerque, Oct. 5-7.
Pennsylvania State Medical Society, Pittsburgh, Sept. 21-24.
Utah State Medical Association, Salt Lake City, Sept. 29-30.
Vermont State Medical Society, Rutland, Oct. 8-9.
Virginia Medical Society, Washington, D. C., Oct. 27-30.
Washington State Medical Association, North Yakima, Sept. 21-23.
Wisconsin State Medical Society, Oshkosh, Oct. 7-9.

Current Medical Literature

AMERICAN

Titles marked with an asterisk (*) are abstracted below.

American Journal of Medical Sciences, Philadelphia

August, CXLVIII, No. 2, pp. 157-312

1 *Syphilis of Liver, Imitating Cirrhosis. W. F. Cheney, San Francisco.
2 *Syphilis of Vertebral Column: Its Symptomatology and Neural Complications. J. R. Hunt, New York.
3 Syphilis of Esophagus. U. J. Wile, Ann Arbor, Mich.
4 Schistosomiasis Japonica: Study of Two Cases. D. Dovaird and R. L. Cecil, New York.
5 *Absence of Hyperplasia of Remainder of Thyroid in Dogs after Piecemeal Removal of Gland. Autotransplantation of Thyroid in Partially Thyroidectomized Animals. J. A. Hunnicutt, Baltimore.
6 Pituitary Disease: Report of Three Cases. A. D. Dunn, Omaha, Neb.
7 Mental Manifestations in Tumor of Brain. A. Gordon, Philadelphia.
8 Peripheral Pigmentation of Cornea, Associated with Symptoms Simulating Multiple Sclerosis. T. B. Holloway, Philadelphia,
9 Infantilism. A. Strauch, Chicago.
10 Smegma Bacillus. G. E. Brereton and K. W. Smith, Madison, Wis.

1. **Syphilis of Liver Imitating Cirrhosis.**—Cheney urges that in any case that appears to be cirrhosis of the liver, judging from clinical history and physical signs, the blood should always be examined for syphilis. If the Wassermann reaction is positive, vigorous specific treatment will often produce marvelous improvement not to be expected in any other way; but even when the reaction is not positive, the liver disease may be luetic, and so specific therapy may prove of no avail; yet at the same time the therapeutic test will have given valuable information and have done no harm. There is no certain way to tell which case of hepatic cirrhosis is luetic and which is not, except by the blood test, for previous history of infection, or of other earlier manifestations of syphilis, as well as stigmata produced elsewhere in the body by the disease, may all be lacking absolutely; while there may be nothing about the condition of the liver on physical examination or the symptoms it produces, to determine the etiology or to distinguish ordinary portal cirrhosis from luetic.

2. **Syphilis of Vertebral Column.**—Syphilitic spondylitis and perispondylitis while rare, Hunt says, are nevertheless sufficiently frequent to be given careful consideration in every case of acute or chronic vertebral disease. The onset may be sudden, simulating an acute rheumatic affection, or it may develop gradually and run an exceedingly chronic and protracted course. Localization in the cervical region, especially, should awaken the suspicion of lues, as more than half of the recorded cases are of this region. It may, however, occur in any portion of the spinal column. Of 100 cases available for analysis, Hunt found that 25 per cent. were associated with some complication referable to the nervous system. These were either of the nerve roots and plexus or of the spinal cord itself. Generally speaking, in this group of cases with neural complications, the symptoms indicated a lesion of the spinal cord in two-thirds; in the remaining third, the neural symptoms were limited to an involvement of the nerve roots or plexus.

5. **Hypertrophy of Thyroid in Dogs.**—According to Hunnicutt three-fourths of the dog's thyroid gland may be removed without appreciably affecting the remainder of the gland. In only 3 of the 59 dogs on which the operation of piecemeal removal was performed did the remaining gland change from a normal to a hyperplastic state. In 5 of the 59 dogs the remaining gland reverted from the early hyperplastic state to the normal state. Where a diagnosis of some degree of hyperplasia was made at the first operation, the pieces removed from the same dogs at subsequent operations had not undergone further hyperplasia. Of the pieces removed from 56 dogs at the first operation, 58 per cent. were normal, 32 per cent. showed early glandular hyperplasia, 5 per cent. marked glandular hyperplasia, and 5 per cent. very early glandular hyperplasia. Definite increase in the size of the remaining gland (hypertrophy) was not observed. The remains of the thyroid lobes, the accessory thyroids, and the successful grafts in a given dog, presented the same histologic picture. In no dog was myxedema or tetany observed in which as much as one-fourth of the thyroid and one parathyroid gland were preserved.

Annals of Ophthalmology, St. Louis

July, XXIII, No. 3, pp. 445-604

11 Parenchymatous Keratitis. A. Alt, St. Louis.
12 Case of Papillary Iritis following an Injection of Salvarsan. C. Loeb, St. Louis.
13 Paralysis of Ocular Muscles. J. F. Shoemaker, St. Louis.
14 Ocular Symptoms of Syphilis of Nervous System. M. Wiener, St. Louis.
15 Therapeutics of Ocular Lues. W. F. Hardy, St. Louis.
16 Salvarsan and Eye. J. Green, Jr., St. Louis.
17 Case of Thrombosis of Retinal Vein. J. H. Claiborne, New York.
18 Case of Double Inversion. G. F. Arps, Columbus.
19 Steel in Eye and Suicide. J. H. McCassy, Dayton.
20 Dacryocystitis Caused by Membranous Closure of Nasal Duct. M. Wiener and W. E. Sauer, St. Louis.

Annals of Surgery, Philadelphia

August, LX, No. 2, pp. 137-280

21 *War Surgery. A. de Page, Brussels.
22 *Amputations. O. Witzel, Dusseldorf.
23 Amputation of Hand. P. von Kuzmik, Budapest.
24 *Amputation of Leg. J. F. Binnie, Kansas City, Mo.
25 *Free Transplantation. E. Lexer, Jena.
26 *Tissue and Organ Transplantation. E. Ullman, Vienna.
27 *Chronic Ulcers of Stomach and Duodenum. W. J. Mayo, Rochester, Minn.
28 *Ulcer of Stomach and of Duodenum. H. Hartmann and P. Lecene, Paris.
29 Diagnosis of Gastric and Duodenal Ulcer. F. de Quervain, Basel.

21, 22 and 24. Abstracted in THE JOURNAL, May 2, pp. 1425 and 1426.

25 and 26. Abstracted in THE JOURNAL, May 16, p. 1581.

27 and 28. Abstracted in THE JOURNAL, May 9, pp. 1501 and 1500.

Archives of Diagnosis, New York

July, VII, No. 3, pp. 201-300

30 Diagnosis of Abnormalities of Myocardial Function. T. S. Hart, New York.
31 *Some of Newer Methods of Diagnosis in Heart Affections. T. E. Satterthwaite, New York.
32 Respiration in Heart Disease. M. Herz, Vienna.
33 Relation of High Systolic to Diastolic Pressure. J. H. Musser, Jr., Philadelphia.
34 Acromial Respiratory Sounds. J. H. Barach, Pittsburgh.
35 *Percussion Sign for Detecting Fluid in Pleura. L. S. Mace, San Francisco.
36 Clinical Features of Abdominal Pain and Tenderness. C. A. Elsberg, New York.
37 Seven Cases of Cutaneous Sarcoma. H. Fox, New York.
38 Primary Family Splenohepatomegaly (Gaucher Type). H. B. Sheffield, New York.
39 Diagnosis of Carcinoma. M. Kahn, New York.

31. **Diagnosis of Heart Affections.**—The importance of Sahli's announcement of the discovery of his band in 1885 is emphasized by Satterthwaite. The band consists of a wreath of dilated reddish colored venous radicles, usually from 1 to 2 inches wide, disposed in somewhat vertical and parallel lines, though dendritic in appearance. It forms a semicircle on the left side of the thorax over the lower ribs, its center corresponding to the nipple, below which it runs at a distance of several inches. It may escape notice unless one examines the skin closely, for sometimes it is narrow, the radicles are minute, or it is imperfectly developed. It is said to have been noticed in thoracic aneurism and mediastinal tumors, but its significance has not yet been established. Judging from analogy, however, Satterthwaite believes that some intrathoracic deposit of a fibroid material has taken place, as in adhesive pericarditis, calling for a collateral circulation. It is of the same nature as the caput medusa seen over the anterior abdominal wall in cirrhosis of the liver.

35. **Fluid in Pleura.**—This sign is produced by placing the pleximeter finger as near as possible at the base of the spinous process of the vertebra on a level with the suspected fluid and on the side opposite to it, and percussing diagonally through the body of the vertebra in the axis of the opposite lung. If fluid is present the resulting note will be flat. If no fluid is present and the lung is consolidated or normal, the resulting note will be dull or resonant but not flat. If the process is reversed, and diagonal percussion made through

the body of the same vertebra toward a normal or consolidated lung opposite the fluid, the resulting note will be resonant or dull but not flat. This method differs fundamentally from the usual method of spinal percussion, viz., percussing directly over the spinous process in the axis of the center of the vertebral body. This gives a mixed note depending on the condition of the organs on both sides of the spinal column. The method of diagonal percussion described by Mace gives in the same vertebra notes characteristic of the lung toward which the percussion is directed.

Archives of Internal Medicine, Chicago

August 15, XIV, No. 2, pp. 145-288

40 *Pathology of the Spleen. J. H. King, Baltimore.
41 *Influence of High-Calory Diet on the Respiratory Exchanges in Typhoid. W. Coleman and E. F. DuBois, New York.
42 Study of Twenty-Nine Cases of Advanced Pulmonary Tuberculosis Treated by Artificial Pneumothorax. L. Kessel and M. Taschman, New York.
43 *Studies on Acidosis and Dyspnea in Renal and Cardiac Disease. F. W. Peabody, Boston.
44 *Clinical and Metabolism Studies in a Case of Myotonia Congenita —Thomsen's Disease. J. Rosenbloom and B. A. Cohoe, Pittsburgh.
45 Case of Aplastic Anemia. J. H. Musser, Philadelphia.

40. **Pathology of the Spleen.**—Following splenectomy, King found that there occurs an increase in the total fats and cholesterin in the blood, and also a reduction in the value of the iodin number (that is, a lower iodin number). In clinical conditions associated with hemolysis, pernicious anemia, hemolytic jaundice, catarrhal jaundice and some forms of cirrhosis of the liver, there is found a decided increase in the value of the iodin number. There appears to be a parallelism between highly unsaturated fatty acids in the blood and hemolysis. The occurrence of these highly unsaturated fatty acids is intimately dependent on the activity of the spleen, for removal of that organ reduces the iodin-combining value of the unsaturated fatty acids and renders the production of icterus by hemolyzing agents more difficult. Also it greatly improves clinical conditions in which hemolysis is at work. This is interpreted to mean that the spleen may be the central point in many diseases in which hemolysis and anemia are active, especially in pernicious anemia. This organ may be conceived to take on an increased function as regards its hemolytic activities, resulting in hemolysis, anemia and icterus.

The condition of asplenism presents in some of its features a diametrically opposite picture. Animals in this condition are more resistant to hemolyzing agents, and icterus is much more difficult to produce. The increase in the total fats and lipoids following splenectomy may explain the increased resistance of the red blood-cells found to accompany the condition of asplenism. These substances have definite antihemolytic properties. In pernicious anemia, hemolytic jaundice, some types of catarrhal jaundice and cirrhosis of the liver, the hyperactive spleen unfavorably influences the anemia, through its regulation of the highly hemolytic unsaturated fatty acids in the blood. Its removal appears therefore to be indicated. Splenectomy of itself, besides influencing the hemolytic unsaturated fatty acids, raises the percentage of antihemolytic substances in the blood; that is, the total fats and cholesterin. King concludes that the fact that total removal of the spleen is not followed by any smptoms dangerous to the life of the patient has probably drawn attention away from the consideration that states of diminished function of this organ may exist.

41. **Influence of High-Calory Diet in Typhoid.**—The Benedict "universal respiration apparatus" employed by Coleman and DuBois in their investigation was tested on normal controls and found to give accurate results. They believe that the apparatus is well adapted to clinical use if Benedict's technic is carefully followed, that is to say, if precautions are taken to prevent leaks, and if results obtained on patients whose breathing is irregular or labored are discarded. Leaks lower the quotient, irregular and labored breathing artificially raise it. The metabolism of liberally fed typhoid patients exceeds that of normal individuals by from 36 to 40 per cent. Previous observers have found that the average basal metabolism during the febrile period of patients who are on diets containing less energy than they produce is 35.3 calories per kilogram per day. Comparing this figure with the averages obtained, after ingestion of food, on typhoid patients who received from 35 to 170 calories per kilogram daily, it is observed that the average metabolism per kilogram of body-weight shows an increase of from 2 to 5 per cent. If the body-surface be made the basis of comparison, it is found that the increase is between 11 and 13 per cent.

Since the variation in the metabolism of different normal persons may amount to 10 per cent. above or 10 per cent. below the normal average, it is obvious that the influence of a large ingestion of food cannot be of great importance in increasing heat production in the febrile stage of the disease. In other words, the large amount of food administered exhibits little or no specific dynamic action, thus removing the chief theoretical objection to the use of liberal diet in typhoid fever. In the high-calory cases approximately 10 per cent. must be added to cover the increase in metabolism caused by bodily exertion incident to moving about the bed. Accordingly the typhoid patients examined had an average theoretical requirement of 38.5 calories per kilogram per day. It has been found, however, that the theoretical requirement must be exceeded by from 50 to 110 per cent. in order to bring the patient into nitrogen and weight equilibrium. The fate of the excess has not yet been discovered. In the steep-curve period and during relapses some patients derived from 84 to 89 per cent. of their calories from carbohydrate and, in addition, transformed some carbohydrate into body-fat. The majority of the high-calory patients showed a sharp rise in the level of the respiratory quotients during the last days of the fever, which we have interpreted to mean that the regenerative processes of convalescence begin before the temperature reaches normal.

43. **Acidosis and Dyspnea in Renal and Cardiac Disease.**—The mild grade of acidosis which is often associated with uncomplicated chronic nephritis, Peabody found, is compenstated for by the increased excretion of acids by the kidney. It is only in uremia and usually only in very advanced uremia that non-volatile acids accumulate in the blood in an amount sufficient to cause depression of the tension of carbon dioxid in the alveolar air. In the terminal stage of uremia there may be a high grade of acidosis. Peabody claims that the development of acidosis bears little relation to the accumulation of non-protein nitrogen in the blood or to the output of phenolsulphonephthalein. Determinations of both of these may show extreme abnormalities before any marked degree of acidosis develops. The development of acidosis is not the direct or sole cause of dyspnea associated with cardiorenal disease. A high grade of acidosis may exist without causing a change in respiration which is evident on the ordinary clinical examination.

In some cases of cardiac disease accompanied by dyspnea there is evidence of a slight accumulation of non-volatile acids in the blood, in other cases there is no evidence of such an accumulation. The tension of the carbon dioxid in the alveolar air is normal or very slightly increased. The hydrogen-ion concentration of the blood remains normal. In neither group of cases is the degree of acidosis sufficient to account for the dyspnea on the basis of an increase in the stimulus to respiration alone. It seems probable to Peabody that an important factor in the causation of dyspnea in cardiac disease is an increase in the excitability of the respiratory center. Such a change in the excitability may well be caused by a lowering of the oxygen tension, and be dependent on an inadequate blood-flow.

44. **Clinical and Metabolism Studies in Myotonia Congenita.**—In a metabolism experiment of thirteen days' duration on a case of myotonia congenita, Rosenbloom and Cohoe found that the patient lost 20.02 gm. of nitrogen, while the urinary nitrogen partition (urea, ammonia, creatinin, uric acid and undetermined nitrogen) was normal in character. Creatin was absent from the urine except after the administration of 620 gm. of egg-yolk. In a period of ten days 0.9 gm. of sulphur was lost, while the urinary sulphur parti-

tion (total sulphates, ethereal sulphates, inorganic sulphates and neutral sulphur) is normal in character. In a period of ten days the patient had a positive phosphorus balance of 1.5 gm., showing that during a time of nitrogen loss, phosphorus was retained. The amount of earthy phosphates and total phosphates in the urine may be considered normal. In ten days 4.09 gm. of calcium oxid and 0.56 gm. of magnesium oxid were lost by this patient. A retention of phosphorus produced by feeding egg-yolk did not cause a retention of calcium. Evidence is produced to show that the loss of calcium may play a part in the production of the symptoms of myotonia congenita. The fact embolism was normal in character, with an absorption of about 90 or 91 per cent. of the ingested fat.

Arkansas Medical Society Journal, Little Rock

August, XI, No. 3, pp. 61-92

46 Anoci-Association. G. W. Crile, Cleveland.
47 Diagnosis and Treatment of Syphilis of Nervous System. L. Thompson and D. W. Roberts, Little Rock.

Boston Medical and Surgical Journal

August 20, No. 8, pp. 289-328

48 Function of Spleen with Particular Reference to Hemolysis and Hemolytic Anemias. H. C. Moffitt, San Francisco.
49 Ergotherapy in Treatment of Mental Disorders. E. C. Reid, San Francisco.
50 *Use of Section of Scapula in Correcting Nasal Deformity. O. A. Lothrop, Boston.
51 Syphilis of Nose. J. Prenn, Boston.

August 27, No. 9, pp. 329-364

52 *Therapeutic Artificial Pneumothorax as Associate Treatment in Pulmonary Tuberculosis. J. A. Lyon, Rutland.
53 Functions of Dispensary or Out-Patient Department. M. M. Davis, Jr., Boston.
54 Analysis of One Hundred Cases Studied in Connection with Municipal Criminal Courts of Boston. V. V. Anderson, Boston.
55 Diagnosis and Treatment of Early Pulmonary Tuberculosis. J. B. Hawes, 2d, Boston.
56 Unusual Phases of Sigmoidoscopy. R. W. Jackson, Fall River.

50. **Use of Section of Scapula in Correcting Nasal Deformity.**—A strip of bone, 2 inches long and about 1/25 of an inch wide was removed by Lothrop from the free vertebral border of the scapula with bone cutting forceps and wrapped in wet, sterile gauze. The attachments of the muscles were first cut from the border and from the external and internal surfaces, great care being taken not to denude the bone of its periosteal covering. A subdermal passageway was made in the nose bridge extending to the distal extremity of the nasal bones. At this point the periosteum of the nasal bones was cut and elevated along the crest of the nose bridge up to the frontal bone. The nasal bones were now ground down with a rasp. The graft was inserted through this passageway and under the periosteum until the end reached to the frontal bone. In three weeks the graft was quite solid and in four weeks it was very rigidly held in place on the nasal bones and the dressing was omitted.

52. **Therapeutic Artificial Pneumothorax in Treatment of Pulmonary Tuberculosis.**—Of the sixty-two patients treated by Lyon two were incipient ones, and treatment was given to relieve frequent hemoptysis. The lungs in both instances have been collapsed since April, 1913, and February, 1913, respectively. There has been no recurrence of the hemoptysis, and for the past several months, the sputum has been negative to tubercle bacilli. There were thirty-one cases in the moderately advanced stage of the disease, two in which the prognosis was questionable, seventeen unfavorable and twelve bad. In three instances the lung was collapsed to relieve hemorrhage and the experiment was successful. The treatment had to be discontinued with two of the patients on account of a recrudescence of the disease in the opposite lung. One developed a severe hemoptysis in the uncollapsed side and the treatment had to be abandoned. Four had to be discontinued on account of a recrudescence in the opposite lung, in one on account of neurosis, in three because Lyon was unable to introduce a sufficient amount of gas to expect any results. In two instances the treatment was abandoned on account of the occurrence of pleural shock, on both attempts to introduce gas the patient became unconscious. The treatment was discontinued in still another case which developed appendicitis. One died following a spontaneous pneumothorax and the treatment was discontinued in another case on account of adhesions at the base of the opposite lung, causing marked dyspnea.

Of the fifteen remaining patients, five have been discharged and are doing well, three of this number are at present employed about the institution and are working eight hours per day. The treatment is being continued satisfactorily in the remaining ten cases, many of whom are soon to be discharged.

The greatest number of injections made in a given case was 28, the maximum amount given was 1,700 c.c. and the minimum amount was 50 c.c. with the exception of the patients suffering from pleural shock. Here, none was given. In the twenty-nine far advanced cases the prognosis was unfavorable in ten, and bad in nineteen. The treatment was discontinued in eight instances on account of recrudescence in the untreated side, four on account of neurosis, ten on account of dense unyielding pleural adhesions. One died of acute cardiac dilatation and pulmonary edema. Of the six remaining patients, one has been discharged as arrested and is working in the institution eight hours per day, three are progressing satisfactorily, the treatment was discontinued in another instance on account of pregnancy and the one remaining is a spontaneous pneumothorax and the collapsed lung has been maintained by occasional introductions of gas. The greatest number of injections with any one person was 20, the maximum amount introduced was 1,600 c.c., and the minimum amount was 50 c.c.

Of the sixty-two cases treated, fifty-eight were bilateral and four were unilateral. The treatment was discontinued in thirteen cases on account of dense unyielding pleural adhesions, and in twelve on account of recrudescence of the disease in the untreated side.

Bulletin of American Academy of Medicine, Easton, Pa.

August, XV, No. 4, pp. 181-264

57 Relation of Modern Medicine to Some Social Problems. J. L. Heffron, Syracuse, N. Y.
58 Relation of Medical Profession to Workmen's Compensation Acts in United States. F. L. van Sickle, Olyphant.

Colorado Medicine, Denver

August, XI, No. 8, pp. 283-326

59 Lumbar Puncture Serologic, Cytologic and Chemical Findings of Mental Disease. C. W. Thompson, Pueblo.
60 Eclampsia, Its Etiology and Treatment. C. A. Ferris, Denver.
61 Treatment of Puerperal Infection. A. R. Pollock, Monte Vista.
62 Transposition of Uterus and Bladder for Cure of Extensive Rectocele and Prolapsus of Uterus. C. H. Graves, Canon City.
63 Plea for Accurate Diagnosis in Lesions of Urinary Tract. T. L. Howard, Denver.
64 Treatment for Magnetic Foreign Bodies in Eye. W. H. Crisp, Denver.

Journal of Biological Chemistry, Baltimore

August, XVIII, No. 3, pp. 329-554

65 Comparison of Carbon-Dioxid Output of Nerve Fibers and Ganglia in Limulus. S. Tashiro and H. S. Adams, Chicago, and Woods Hole, Mass.
66 Biochemistry of Iodin. I. Distribution of Iodin in Plant and Animal Tissues. A. T. Cameron, Manitoba.
67 *Effect of Acute Destructive Lesions of the Liver on its Efficiency in the Reduction of the Ammonia Content of the Blood. C. H. Fiske, and H. T. Karsner, Cambridge, Mass.
68 Biochemistry of Purine Metabolism. I. Excretion of Purine Catabolites in the Urine of Marsupials, Rodents and Carnivora. A. Hunter, M. H. Givens and C. M. Guion, Ithaca, N. Y.
69 Allantoin. M. H. Givens, Ithaca, N. Y.
70 Organic Phosphoric Acid Compound of Wheat Bran. R. J. Anderson, Geneva, N. Y.
71 *Organic Phosphoric Acid Compound of Wheat Bran. III. Inosite Monophosphate. R. J. Anderson, Geneva, N. Y.
72 *Behavior of Sugar and Lactic Acid in the Blood Flowing from the Liver after Temporary Occlusion of the Hepatic Pedicle. J. J. R. MacLeod and A. M. Wedd, Cleveland.
73 On Sphingomyelin. P. A. Levene, New York.
74 Purification and Melting Points of Saturated Aliphatic Acids. P. A. Levene and C. J. West, New York.
75 Action of Tissues on Methyl Glucosides, Tetramethyl Glucosides and Natural Disaccharides. P. A. Levene and G. M. Meyer, New York.
76 Sphingosine. Oxidation of Sphingosine and Dihydrosphingosine. P. A. Levene and C. J. West, New York.

77 Parenteral Utilization of Disaccharid Sugars. A. G. Hogan, New Haven, Conn.
78 *Some Anaphylactic Reactions. H. C. Bradley and W. D. Sansum, Madison, Wis.
79 *Blood in Acidosis from the Quantitative Standpoint. W. M. Marriott, St. Louis.
80 Influence of Protein Intake on Formation of Uric Acid. A. E. Taylor and W. C. Rose, Philadelphia.
81 Uricolysis. A. E. Taylor and W. H. Adolph, Philadelphia.
82 Creatin and Creatinin. P. A. Shaffer, St. Louis.
83 Simplification of the Determination of Total Nitrogen by Calorimetry. A. Gulick, New York.
84 Comparative Biochemistry of Purine Metabolism. II. Excretion of Purine Catabolites in the Urine of Ungulates. A. Hunter and M. H. Givens, Ithaca, N. Y.
85 Cerebronic Acid. Constitution of Lignoceric Acid. P. A. Levene and C. J. West, New York.

67. **Effect of Lesions on Hepatic Function.**—Oxygenation of the perfusing fluid by pure oxygen instead of air renders more complete the reduction of the ammonia content of the fluid as it passes through the liver. Fiske and Karsner found no difference between normal livers and livers poisoned with the various toxic substances mentioned with respect to their ability to lower the ammonia content of the blood perfused through them.

71. **Organic Phosphoric Acid Compound of Wheat Bran.**—A previously unknown organic phosphoric acid, inosite monophosphate, $C_6H_{13}O_9P$, has been isolated by Anderson in beautiful crystalline form from wheat bran. All of the salts of this acid, with the exception of the lead salt, are very soluble in cold water. The alkaline earth salts are not precipitated with ammonium hydroxid, differing in this respect from other known organic phosphoric acids as well as from ordinary phosphoric acid.

72. **Sugar and Lactic Acid in Blood.**—The authors' experiments demonstrate that lactic acid is readily produced in the liver as a result of local stagnation of blood flow. This production of lactic acid, they believe, is probably dependent on the asphyxial condition which is induced, and it is very likely from glycogen that it is derived.

78. **Some Anaphylactic Reactions.**—Guinea-pigs sensitized to beef or dog hemoglobin fail to react, or react but slightly, to hemoglobins of other origins. The hemoglobins tried were dog, beef, cat, rabbit, rat, turtle, pig, horse, calf, goat, sheep, pigeon, chicken and man. The authors conclude that hemoglobins from different sources are chemically different. A low order of sensitization to isogenous proteins is found in guinea-pigs injected with guinea-pig tissue-proteins.

79. **Acetone Substances in the Blood.**—A revised technic for the determination of acetone bodies in small samples of blood is described by Marriott. He says that the blood of normal human subjects, and of dogs, pigs and cattle contains less than 1.5 mgm. of acetoacetic acid and less than 4 mgm. of butyric acid per 100 grams of blood, the results being expressed in terms of acetone. In acidosis the acetone bodies in the blood are higher than normal. The highest figure obtained was 28 mgm. of acetoacetic acid and 45 mgm. of oxybutyric acid per 10 grams of blood, expressed as acetone.

Journal-Lancet, Minneapolis

August 15, XXXIV, No. 16, pp. 425-450

86 Mayo Clinic Building at Rochester. R. O. Beard, Minneapolis.
87 Direct Laryngoscopy and Bronchoscopy. C. Kachelmacher, Fargo, N. D.
88 D'Arsonval Current in Treatment of Hypertension. C. W. Watson, Minneapolis.
89 Nervous Symptoms in Nephritis. E. H. Grove, Hetland, S. D.

Journal of Pharmacology and Experimental Therapeutics

July, V, No. 6, pp. 527-648

90 Action of Certain Drugs on Uterus of Guinea-Pig and of Rat. J. A. Gunn and J. W. C. Gunn, Oxford, England.
91 Effect on Respiration of Altered Vascular Conditions in Lungs. W. E. Dixon and F. Ransom, Cambridge, England.
92 Solubility of Lead Sulphid Ores and of Lead Sulphid in Human Gastric Juice. A. Woelfel and A. J. Carlson, Chicago.
93 Effects of Chloroform and of Ether Anesthesia on Protein Contents of Blood Serum of Rabbits. L. W. Buck, San Francisco.
94 *New Standard for Determination of Strength of Pituitary Extracts. G. B. Roth, Washington, D. C.
95 *Experiments on Cardiac Action of Camphor. O. H. Plant, Philadelphia.
96 *Efficiency of Knowlton-Starling Isolated Heart-Lung Preparation for Testing Cardiac Action of Drugs. O. H. Plant, Philadelphia.
97 Removal of Diffusible Substances from Circulating Blood of Living Animals by Dialysis. J. J. Abel, L. C. Rowntree and B. B. Turner, Baltimore.
98 Plasma Removal with Return of Corpuscles. J. J. Abel, L. G. Rowntree and B. B. Turner, Baltimore.

94. **Strength of Pituitary Extracts.**—The use of *B*-imminazolylethylamin hydrochlorid in 1 to 20,000,000 solution is suggested by Roth as a new standard for the determination of the activity of infundibular extracts when the isolated uterus of the virgin guinea-pig is used as the test organ.

95. **Cardiac Action of Camphor.**—Perfusion of the normal frog's heart with camphor failed to produce any constant effect which, Plant says, can be considered with certainty an evidence of stimulation. Application of a saturated solution of camphor to the exterior of a chloralized frog's heart caused marked but rather transient increase in rate of contraction. Ether solution applied in the same way had a similar though less marked effect.

The rate of contractions in isolated strips of normal ventricular muscle from the turtle's heart, was increased by moderate amounts of camphor in a majority of experiments. The amplitude of the contractions was not increased. Camphor was without effect in chloralized strips.

In the normal isolated dog's heart camphor failed to produce any distinct and constant stimulation; such effects as were observed were too slight and occurred too seldom to be attributed with certainty to stimulation by the drug. In chloralized dogs' hearts and in hearts that showed fatty degeneration from poisonous doses of phosphorus, camphor was without any beneficial effect. Taken as a whole the results of different series of experiments lead to the conclusion that camphor does not produce effects which entitled it to be regarded as a direct cardiac stimulant.

96. **Testing Cardiac Action of Drugs.**—The drugs tested by Plant were applied at the end of experiments in which camphor had been tested and usually after the heart had been isolated for two or four hours. Caffein produced a moderate but very distinct degree of stimulation, evidenced by an increase in rate, in amplitude of contractions, in output per minute and a slight increase in the pressure of the blood in the arterial tube leading to the artificial resistance. There was apparently a direct relationship between the increased output and the increase in rate, since the output per beat was not materially changed during the period of stimulation by the caffein; the relaxation of the heart was slightly less during this period.

Strophanthin caused a marked increase in output per minute and in amplitude of the contractions, and a moderate increase in the pressure in the arterial tube. Changes in rate were very slight, consisting in an increase of two to five beats per minute. The intra-auricular pressure as recorded by a water manometer connected with the inferior cava was decreased. The increase in efficiency of the heart under epinephrin produced a marked increase in the heart rate, in amplitude of contractions, in output and in arterial pressure; the pressure in right auricle was decreased. The effect was very striking but lasted only a short time.

Lancet-Clinic, Cincinnati

August 22, CXII, No. 8, pp. 197-224

99 Need for Whole-Time Health Officer. H. A. Cowing, Muncie, Ind.
100 Spasms. H. H. Hoppe, Cincinnati.
101 Hydroadipsia and Water Supply of Living Bodies. Z. C. M'Elroy, Zanesville.
102 Graduates of Medical Department of University of Pennsylvania Who Have Taught or Practiced in Cincinnati. A. G. Drury, Cincinnati.

Medical Record, New York

August 29, LXXXVI, No. 9, pp. 363-404

103 Intestinal Intoxication. H. Eppinger, Vienna, and J. Gutman, Brooklyn.
104 Sterilization of Mental Defectives from Physiologic Standpoint. A. W. Peters, Vineland, N. J.
105 Plea for More Rational Use of Vaccines. S. R. Blatteis, Brooklyn.
106 Radium in Treatment of Diseases of Ear. W. S. Bryant, New York.
107 Pellagra. J. R. Lowery, Raleigh, N. C.
108 Plea for More Care in Treatment of Follicular Tonsillitis. W. Lapat, New York.
109 Two Cases of Treatment by Radium Emanation. F. E. Park, Stoneham, Mass.

Modern Hospital, St. Louis

August, III, No. 2, pp. 69-140

110 Chicago-Winfield Tuberculosis Sanatorium. J. L. Anderson, Chicago.
111 Hospital Work of Labrador Mission. G. W. Corner, Baltimore.
112 New Hospital of House of Calvary. R. J. Reiley, New York.
113 Ward Waste and What Is Done with It. K. H. Van Norman, Baltimore.
114 Boom in Dispensary Work—Its Growth and Development. M. M. Davis, Jr., Boston.
115 New Children's Hospital at Los Angeles. M. L. Vannier, Los Angeles.
116 Artificial Illumination of Hospital Spaces. H. B. Wheeler, Chicago.

New Mexico Medical Journal, Las Cruces

August, XII, No. 5, pp. 127-153

117 Important Factors in Prognosis of Pulmonary Tuberculosis. J. S. Cipes, Albuquerque.
118 Tuberculin. D. C. Twichell, Silver City.

New York State Journal of Medicine

August 22, C, No. 8, pp. 349-396

119 *Practical Application of Luetin Test. H. Noguchi, New York.
120 Present Status of Complement Fixation Test in Diagnosis of Gonorrheal Infections. A. McNeil, New York.
121 Infantile Roots of Masochism. P. Federn, Vienna.
122 Adipose and Lipomatosis. G. E. Price, Philadelphia.
123 Medical and Bacteriologic Experiences During Late Balkan War. B. Jablons, New York.
124 Removal of Two Nails from Bronchi of Child Two Years Ago by Bronchoscopy. R. H. Good, Chicago.
125 Investigation of Gastric Neuroses with Vago-Excitative Characteristics. S. Neuhof, New York.
126 Functional Tests of Static Labyrinth in Neurologic Diagnosis. I. Friesner and A. Braun, New York.
127 *Modified Gastroduodenal Tube. M. E. Rehfuss, Philadelphia.

August 29, No. 9, pp. 397-448

128 General Paresis. D. M. Kaplan, New York.
129 *Digitalis in Chronic Diseases of Heart. L. F. Bishop, New York.
130 Surgical Treatment of Infantile Paralysis. J. W. Moore, Philadelphia.
131 Is Tuberculosis Crusade Becoming Burlesque? T. J. Mays, Philadelphia.
132 Roentgen Diagnosis in Fractures of Cranium in Children. G. Rosenbaum, Philadelphia.
133 Congenital Malformations of Rectum and Anus. M. R. Bookman, New York.
134 Injurious Effects of Light on Eyes. W. B. Lancaster, Boston.
135 *Placental Blood for Transfusion. G. Rubin, Chicago.
136 An Aid in Use of Allis Inhaler. P. A. Sheaff, Philadelphia.

119. **Practical Application of Luetin Test.**—Based on the observations made by about fifty investigators, the following statistical estimation of the practical value of the luetin reaction is presented by Noguchi:

Primary Syphilis.—The reaction is present in less than 30 per cent. of cases and the intensity of the reaction is usually very mild.

Secondary Syphilis.—The reaction was reported positive in 47 per cent. of 630 cases. The reaction is usually mild.

Tertiary Syphilis.—The reaction was found in about 80 per cent. of cases. The reaction is very severe in this stage of the disease (usually pustular form).

Congenital Syphilis.—The reaction was reported to occur in about 70 per cent. of cases. Brown, who made the largest series of tests, found it present in 93 per cent. of seventy-five cases studied. The reaction becomes more distinct after energetic treatment.

Syphilis of the Nervous System.—The reaction is less frequently present in acute syphilitic meningitis than in the parenchymatous affections, such as general paralysis and tabes, where it has been reported positive in about 60 per cent. of cases.

Visceral Syphilis.—The reaction is present in nearly 90 per cent. of cases, especially is it marked in the cases of aortic insufficiency.

With reference to the relation of the luetin reaction to the Wassermann reaction, all investigators agree on one point, viz., that the two reactions do not always run parallel in the same cases. Thus the luetin reaction may be absent when the Wasserman is strongly positive, or the reverse. Both reactions, however, are frequently found to occur in the same patient, especially in cases of congenital syphilis and general paralysis. This discrepancy is explained by Noguchi by the fact that the luetin reaction indicates the allergy and the Wassermann the presence of an active syphilitic process. Moreover, is it not difficult to explain the reason why a patient in whom the Wassermann reaction was, by a recent energetic treatment, reduced to a negative, should respond more readily to the luetin reaction than before the foregoing treatment, and in this particular respect the luetin reaction is able to furnish the physician with a prognostic measure in a restricted sense. From the statistics of the luetin reaction it is seen that the Wassermann reaction is much more constant among the primary and secondary cases, as well as in general paralysis, but the reverse is the case in the chronic cases, especially in those under treatment.

127. **Gastroduodenal Tube.**—Rehfuss points out that with his modified gastroduodenal tube it is possible, following the technic described, not only to ascertain the whole cycle of gastric digestion, but to locate the presence of liquid rests, hypersecretion, stasis, by a method of insufflation and auscultation described above. It is possible to determine the end point in gastric digestion, by failure to aspirate material when the patient is placed in different positions; by the character of the samples obtained; by the character of the sound produced by insufflation and heard by auscultation; by lavage. A method of outlining the stomach on the principle of the stomach whistles, is possible.

129. Abstracted in THE JOURNAL, July 18, p. 270.

135. **Placental Blood for Transfusion.**—A patient with pernicious anemia received three intravenous injections of defibrinated blood, and one injection in the gluteal muscles, with remarkable results. Rubin's patient was a woman, aged 55 years, with a general history and blood-picture of a typical pernicious anemia. Red blood-cells, 1,100,000; poikilocytosis; megaloblasts; megalocytes; normoblasts; leukocytes, 6,500. She had frequent attacks of dyspnea and tachycardia. She received 6 ounces of defibrinated fresh placental blood, mixed with an equal amount of normal sodium chlorid solution, making a total of 12 ounces. This was injected through a vein in the flexure at the elbow, the blood being kept at about body temperature. The red blood-cells increased 400,000 in less than twenty-four hours. The patient showed signs of immediate improvement. There was no dyspnea nor tachycardia. A week later 16 ounces of blood in normal salt solution were again injected intravenously in the other arm, but after 10 ounces had run in, extravasation took place and blocked the vein, so the balance of 6 ounces was injected in the gluteal region. The red cells increased 200,000 within twenty-four hours. A third injection of 16 ounces of blood in normal salt was made a week later, increasing the red cells 500,000 in twenty-four hours. The patient's general condition improved even more than the blood.

New York State Journal of Medicine

August, XIV, No. 8, pp. 389-429

137 *Drop Heart—Heart of Congenital Asthenia. C. L. Greene, St. Paul, Minn.
138 Sporadic Cretinism. Study of Forty-One Cases. C. Herrman, New York.
139 Cavernous Sinus Thrombosis. Case Report. T. R. Pooley, New York.
140 Plea for Diabetic. D. C. Mariarta, Saratoga.
141 Diabetes and Metabolism. W. B. Vanderpoel, New York.
142 Conservatism in Operative Treatment of Simple Fractures. G. Woolsey, New York.
143 Need of More Accurate Knowledge in Diagnosis of Mastoiditis by General Practitioner. J. F. McCaw, Watertown.
144 Neglect of Laboratory Aids to Diagnosis. D. Wilson, Amsterdam.
145 Tuberculin as Prophylactic. H. Greeley, Brooklyn.
146 Vaccine Therapy, Theory and Application. W. C. Thro, New York.

137. **Drop Heart.**—Greene maintains that contrary to current belief both drop heart and its chronic dilatations are extremely common and, indeed, should logically be anticipated in view of our present knowledge of the musculature of such hearts.

They have been hitherto overlooked because of the natural tendency to accept as the normal a standard of measurements far in excess of the drop heart normal and a failure to apply the simplest of therapeutic tests.

Another cause of general oversight has been the absence of serious symptoms of incompensation, apart from dilatation, and the decided dominance of subjective manifestations.

In the absence of proper diagnostic tests, the subjective manifestations are in great measure indistinguishable from those of so-called neurasthenia and nervous dyspepsia, both of which in most instances are directly associated with chronic congenital asthenia and its visceroptoses.

The type of individual carrying congenital asthenia is easily recognizable and in itself at once suggest the presence of the asthenic for drop heart. Greene insists that diagnosis must be based on the basic stigmata, the decided changes wrought by rest, the administration of full therapeutic doses of some standard digitalis preparation and results of repeated careful percussion with modern technic and a full record of symptoms.

The use of digitalis as a test measure is not only justified but required not only for the recognition of masked dilatations of drop heart, but for the silent enlargements of degenerative types as well.

The congenitally asthenic heart may initiate symptoms of the most varied character or intensify those originating in other viseceroptotic organs or finding expression in the nervous system as a whole.

It is therefore a definite and important contributive factor in those morbid states underlying the greater part of our chronic invalidism.

A few full doses of digitalis, rest modified or absolute, the comparison of carefully determined outlines obtained by modern methods are simple and efficacious means of making a primary diagnosis.

Not all drop hearts are symptom producing nor do the stigmata of congenital asthenia in general mean necessarily that their possessors must be chronic invalids.

Greene believes that dilated drop hearts, while often borne by well nourished individuals without active symptoms, may play a large part in the actual initiation of neurasthenic and dyspeptic symptoms in victims of malnutrition or infections.

Northwest Medicine, Seattle

August, VI, No. 8, pp. 223-256

147 Autoserotherapy. E. A. Pierce, Portland, Ore.
148 Artificial Pneumothorax in Treatment of Pulmonary Tuberculosis. R. C. Matson, Portland, Ore.
149 Relation of Temperature to Incipient Tuberculosis. J. N. Alley, Lapwai, Ida.
150 Application of Several Orthopedic Principles to General Surgery. E. A. Rich, Tacoma.
151 Expert Testimony and Malpractice Suits. J. M. Semple, Spokane.
152 Affections of Eyes Caused by Sinus Infection. C. Seamann, Portland, Ore.
153 Impressions Received from Visit to Some Eastern Surgical Clinics. J. T. Mason, Seattle.

Ohio State Medical Journal, Columbus

August, X, No. 8, pp. 455-518

154 Efficiency of Radium in Surgery. R. Abbe, New York.
155 Health Activity by an Insurance Company; Its Work in Ohio. L. K. Frankel, New York.
156 Mastoid Complications. J. W. Murphy, Cincinnati.
157 *Prophylaxis of Ophthalmia Neonatorum. M. D. Stevenson, Akron.
158 Fractures of Skull. S. D. Foster, Toledo.
159 *Hydrophobia: Report of Case. With Autopsy Findings. H. H. Drysdale, Cleveland, and A. A. Johnston, Omaha.
160 Some Considerations after 13,000 Administrations of Nitrous Oxid. W. I. Jones, Columbus.

157. **Prophylaxis of Ophthalmia Neonatorum.**—Stevenson considers it advisable in the present stage of work for the prevention of blindness from babies' sore eyes, that the old idea among the public that it is always or nearly always gonorrheal in its origin, should be corrected. He urges that the laity should be taught the plain facts, that while a certain small percentage of cases of babies' sore eyes are caused by the gonococcus, the large majority of the cases are produced by the various ordinary forms of pus-producing germs that are likely to be found in any mother; and that the presence of babies' sore eyes does not necessarily imply any guilt or wrong on the part of either parent. So long as the disease is thought to be purely gonorrheal in its origin, there will be associated with its treatment and attempts at its prevention a great deal of unnecessary embarrassment to the family and the physician. If such a belief is prevalent the physician will naturally be afraid, in many families, to suggest the use of prophylaxis, fearing that it will be considered a reflection on the character of the mother or father, parents also would be afraid to suggest, let alone insist on, the use of prophylaxis. As a not necessarily gonorrheal disease, its public discussion will be much easier, it will receive more respectful attention, and will not be considered a part of the present almost hysteric propoganda with regard to sex hygiene and other subjects that are sometimes too freely discussed.

159. **Hydrophobia.**—The patient whose case is cited by Drysdale and Johnston presented some very unusual symptoms. In the first place, there was absolutely no record or knowledge of a bite by a dog or other animal. Second most of the pain of which this patient complained was confined to his right arm and seemingly had its origin in a recent wound on the dorsal aspect of his second finger. Tetanus, however, was promptly eliminated; there was no evidence or suspicion of trismus, permanent rigidity, orthotonus, opisthotonus or emprosthotonus. A complete review of the history of the case, the nature of the spasms and the rapid progress of the malady was sufficient to show that the disturbance was in no manner related to hysteria. The functional symptom syndrome that prevailed, that is, hemianesthesia, etc., was undoubtedly the expression of his psychopathic constitution.

The reflexes were found to be much slower on the left side as compared to those on the right. The left cremasteric, left plantar and left conjunctival responses were extremely sluggish if not abolished. No clonus Babinski phenomena, Rombergism, or spasticity was elicited. His station and gait were correct. The entire left side of his body, including the face and head, was totally anesthetic, and severe pin prods over this area did not draw blood. The surface sensibility of the right side was slightly hyperesthetic. The line of demarcation between the two sensory conditions was as sharp as the point of a needle. The patient had full control of all bodily movements; the grasp of his hands was strong; the strength of his arms vigorous, and the power of both lower limbs were apparently unimpaired. During a part of their examination, he sat on the edge of his cot and appeared quite jovial and unconcerned.

He was asked if he desired a drink of water, and instantly the typical hydrophobia spasm of the muscle of deglutition and respiration appeared. The facial expression was horrible; the muscles of the neck seemed to stretch almost to the point of snapping, and his eyes presented a "hunted look." He became cyanotic; his mouth was widely opened, and the pulse became almost imperceptible. For a few moments, he struggled to catch his breath, but ultimately relaxed. In a very short time he was quite himself. His craving for water was terrible. His mother handed him a piece of cake which he promptly ate, with little, if any, difficulty. Unintentionally, the word "water" again happened to be mentioned, and again he was thrown into a spasm equally as severe as the one from which he had just emerged.

The patient's throat was carefully examined, and the fauces were found to be extremely congested. A wad of cotton attached to an applicator was inserted deep into the pharynx and no reflex resulted. As a final test, to exclude lyssophobia, he was urged to try to relax and slowly swallow a little water. This he tried to do, closing his eyes as the glass of water was brought to his parched lips. Every mouthful was explosively expelled the moment it reached the fauces. The spasmodic seizures increased in frequency and severity. He would scream for water, but the very sight of it would precipitate violent spasms. He was able to drink a little milk and tea to within twenty-four hours of his death. He ultimately became delirious. In one attack, he violently drove his fist through the plaster on the wall, but at no time did he attempt to bite or bark. He succumbed from cardiac syncope, after three hours of almost constant convulsions and maniacal frenzy. A necropsy was performed eighteen hours after death. Sections were made from different pieces of the brain tissue, but no Negri bodies were found. A rabbit and guinea-pig were inoculated with this material. The former subdurally, the latter intramuscularly. The rabbit died the next day, evidently from mechanical injury in inoculation. The guinea-pig is still living.

A portion of the medulla was emulsified in glycerin. August 12, 0.3 c.c. of the glycerin emulsion was injected subdurally into a rabbit. No change was noted until exactly four weeks after, when the rabbit refused to eat. It was drowsy and would continually lie on its left side, it appeared thirsty and drank much water. The next day, its hind extremities were helpless, and when stimulated to move, would drag along and fall over on its left side, apparently exhausted. The next day, its forelimbs were also paralyzed. During the day the paralysis became complete. The breathing became rapid. Death occurred during the night. On examination, grossly nothing was found except a diffuse congestion of the pia mater. Microscopically, Negri bodies were found, also typical Von Gehuchten degeneration of the ganglia.

Ophthalmic Record, Chicago

August, XXIII, No. 8, pp. 379-432

161 New Operation for Conical Cornea. F. B. Tiffany, Kansas City, Mo.
162 Sympathetic Optic Neuritis or Transferred Papilloretinitis, Associated with Only Mild Serous Iridocyclitis. Report of Case. H. B. Decherd, Dallas, Tex.
163 New Electric Ophthalmoscope. C. H. May, New York.
164 Abraham Lincoln. Diagnosis of Heterophoria from Portrait and Diplopia. E. E. Holt, Portland, Me.
165 Case of Relapsing Acute Iritis Apparently Cured by Use of Autogenous Vaccine. H. C. Parker, Indianapolis.

Pennsylvania Medical Journal, Athens

August, XVII, No. 11, pp. 851-932

166 What Is the Purpose of Constitution and By-Laws of County Society? J. M. Burt, Erie.
167 Diagnostic Problems of Upper Abdomen. D. Riesman, Philadelphia.
168 Pneumonias of Childhood. C. K. Alger, Swarthmore.
169 Not Faucial but Lingual Tonsil. W. A. Hitschler, Philadelphia.
170 Relations of Nose, Throat and Mouth Conditions to Trifacial Neuralgia. G. M. Coates, Philadelphia.
171 Relation of Medical Profession to Workmen's Compensation Acts in United States. F. L. van Sickle.
172 Middle Turbinate as Factor in Headaches. J. A. Hagemann, Pittsburgh.
173 Diphtheria. J. A. Doyle, Greenville.

Texas State Journal of Medicine, Forth Worth

August, X, No. 4, pp. 147-178

174 Importance and Significance of Tears of Perineum and Cervix. E. D. Martin, New Orleans.
175 Cancer of Uterus. J. E. Gilcreest, Gainesville.
176 Some Difficulties Encountered in Making an Early Diagnosis of Cancer of Uterus. H. A. Barr, Beaumont.
177 Carcinoma of Uterus. H. F. Connally, Waco.
178 Cancer Quack; How Eliminate Him? J. H. Vaughan, Liberty Hill.
179 High Cost of Roentgen Ray When You Use It; Higher Cost When You Do Not. G. D. Bond, Fort Worth.
180 *New Supravaginal Plastic Hysterectomy. L. L. Shropshire, San Antonio.

180. **New Supravaginal Plastic Hysterectomy.**—This is the uterus-splitting operation with removal of a wedge-shaped piece from the center of the body of the uterus. After separating the bladder from the uterus down to the internal os, Shropshire clamps the uterus on either side from the insertion of the Fallopian tube to its center at the internal os with a specially devised hysterectomy clamp, and using it as a guide, transfixes the uterus at the points of the clamps with a long sharp-pointed knife, bringing the blade out of the fundus at the inner side of the clamp, making a smooth-cut surface; then by drawing the clamps together, he brings the two marginal-cut surfaces of the uterus into close apposition and puts in two rows of chromic gut sutures.

Vermont Medical Monthly, Burlington

August, XX, No. 8, pp. 199-220

181 Concerning Communicable Diseases and their Management. W. P. Northrup, New York.
182 Tonsils—Safeguard or Menace? J. M. Hamilton, Rutland.
183 Surgical Obstetrics. J. M. Gile, Hanover, N. H.
184 Aspects of High Blood-Pressure. C. M. Sneden, Littleton, N. H.
185 Poliomyelitis. O. D. Eastman, Woodsville, N. H.

Wisconsin Medical Journal, Milwaukee

August, XIII, No. 3, pp. 91-130

186 Osteitis Fibrosa Cystica. J. F. Smith, Wausau.
187 Intranasal Treatment of Chronic Frontal Sinus Suppuration. W. E. Grove, Milwaukee.
188 Extrasacular or Sliding Hernia. V. F. Marshall, Appleton.
189 Relation of Psychiatrist to Juvenile Court. A. M. Rogers, Milwaukee.
190 Surgical Aspect of Diseases Producing Peritonitis in Upper Abdomen. W. E. Fairfield, Green Bay.
191 Application of University Extension Methods to Certain Lines of Medical Practice. J. R. Taylor, Madison.
192 Cancer and Cancer Problem. W. E. Ground, Superior.

FOREIGN

Titles marked with an asterisk (*) are abstracted below. Single case reports and trials of new drugs are usually omitted.

British Medical Journal, London

August 15, II, No. 2798, pp. 321-348

1 Duty of State Toward Early Environment of Child. W. L. MacKenzie and T. Dewar. 3. Environment of Child. O. Gordon. 4. Eyes and Eyesight of Children. A. R. Galloway. 5. Dental Point of View. J. S. Wallace.
2 Medical Certification Other than Under Lunacy Acts. C. Sandeman.
3 *Serum Diagnosis of Pregnancy and of Cancer. A. Leitch.

3. **Serum Diagnosis of Pregnancy and of Cancer.**—The details of 100 cases examined by Leitch to test the method in the serum diagnosis of cancer are as follows: in the first set of experiments three different substrates were employed: (1) A large protuberant, non-ulcerated squamous-cell carcinoma of the scalp, extremely cellular, with fine supporting fibrous-tissue trabeculae, the tumor being easily washed free of blood and being almost dead white; (2) a cellular spheroidal-cell carcinoma of the breast with a minimal amount of stroma; (3) placenta.

The 9 cancer serums all gave positive results with the epitheliomatous tissue—if anything, more markedly in the case of squamous cell than in other carcinomata—whereas the 12 non-cancerous cases were negative with the exception of a case of lipoma. The mammary cancer was not such a good substrate. It did not give as good results with the mammary cancer cases as did the epithelioma. With it 5 cancer serums were tested; 3 gave positive reactions, 2 were absolutely negative; of 5 non-cancer cases, 4 were negative, 1 was positive. With placenta, 8 cancer serums were tested, 7 gave positive reactions, 1 was negative; of the 7 non-pregnant, non-malignant cases 1 was positive. In all cases the serums were used fresh.

In another series the serums were tested simultaneously against four different cancers: (1) a carcinoma of the breast; (2) an epithelioma of the cervix which it was impossible to free from blood; (3) a protuberant epithelioma of the vulva; (4) an epithelioma of the tongue. With the mammary carcinoma substrate only 4 cancer serums out of 12 gave positive results, and all 3 non-malignant cases were positive; with the uterine cancer substrate 9 cancer serums out of 12 gave positive results, and 1 of the 3 non-malignant cases was positive; with the vulvar cancer substrate 4 cancer serums out of 12 were positive, and of the non-malignant serums 1 was positive; with the lingual cancer substrate 2 of the 12 cancer serums gave positive results, and of the non-malignant cases 1 was positive. The mammary cancer substrate only succeeded in picking out 1 of the 6 cases of mammary carcinoma, the uterine cancer substrate picked out 2 of 3 cases of uterine cancer, and the vulvar cancer substrate picked out the case of vulvar cancer.

Of the 100 cases tested by Leitch to prove the worth of the method in the serum diagnosis of cancer, 51 were cancer and 49 were non-malignant. In the 51 cancer cases positive results were obtained in 28, that is, 55 per cent.; and in the 49 non-cancerous controls positive results were obtained in 18, that is, 37 per cent. In Leitch's opinion, therefore, the method is without diagnostic value.

The conclusions to which Leitch has come after a careful investigation of Abderhalden's dialysation method are that the real fallacies of the technic are beyond control, and that the hypothetical fallacies which Abderhalden invokes to account for false reactions have no bases. Positive results are quite well accounted for by the facts that "substrates" alone, and the serums alone, give diffusible substances reacting with ninhydrin; that the dialysers vary enormously in

the quantities of such substances which they allow to pass in a given time; that serums, influenced by the distilled water and by the presence of a tissue acting in virtue of its physical state, are progressively cleaved; and that it is not the substrate which is split by the serum so much as the serum which is split by the substrate. These real fallacies quite destroy the value of the method, and they cast grave doubts on the whole theory.

As to the value of the method in pregnancy, Leitch states that he may have been unconsciously generous to an attractive theory in his reading of the reactions, but he does not attach much weight to that explanation. It may be that pregnant serum more commonly possesses the property of being split up when some suitable physical accessory is added such as placental tissue. But what seems more probable is that there exists in serum, more frequently, though not exclusively, in pregnancy, a general proteolytic and peptolytic power which we can demonstrate by adding a suitable, though not necessarily a specific protein or peptone. The serum of the normal guinea-pig is generally credited with a fairly strong proteolytic power. Leitch tested the action of several guinea-pig serums on egg albumen, coagulated cancer tissue, human blood-clot, and human placenta, and it happened that only with the latter were strong reactions evident. That seems to show that placenta protein is a suitable substrate for the demonstration of a general proteolytic power.

Journal of Laryngology, Rhinology and Otology, London

August, XXIX, No. 8, pp. 393-448

4 Suspension Laryngoscopy and Its Practical Use. G. Killian.
5 Case of Paralysis of External Rectus Muscle Due to Presence of an Abscess in Apex of Petrous Pyramid. Death from Basal Meningitis. G. Wilkinson.
6 Bisubmucous Resection of Septum Nasi. J. van der H. Leonhard.

Journal of State Medicine, London

August, XXII, No. 8, pp. 449-512

7 Germ Carriers. L. Vaillard.
8 Rise and Progress of Factory Legislation. T. Oliver.
9 Work of the Metropolitan of Paris. L. Biette.

Journal of Tropical Medicine and Hygiene, London

August 1, XVII, No. 15, pp. 225-240

10 Coastal Climate of Tropical Queensland. F. H. Taylor and W. J. Young.
11 Entamebiasis. L. B. Keng.

Lancet, London

August 15, II, No. 4746, pp. 435-480

12 Heredity. W. Bateson.
13 Congenital Atresia of Postnasal Orifice. C. W. Richardson.
14 *Pregnancy Complicated by Severe Morbus Cordis: Two Cases Treated by Hysterotomy Under Spinal Anesthesia. J. B. Banister.
15 Gun Deafness and Its Prevention. J. Horne.

14. Pregnancy Complicated by Severe Morbus Cordis.—Banister cites two cases treated by hysterotomy under spinal anesthesia. Case 1.—The patient, a primagravida, aged 21, four months pregnant, had two years previously had a severe attack of rheumatic fever, subsequent to which she developed a mitral stenosis. She had been unwell since the sixth week of pregnancy. There had been very severe vomiting, coupled with dyspnea and edema. She had been kept at rest and treated by the usual cardiac tonics, but reaction had been unsatisfactory. When Banister saw her she was cyanosed and dyspneic, her pulse was 124 and irregular, with the galloping rhythm characteristic of marked failure of compensation. Her temperature was 101.6 F. Examination revealed a normal four months pregnant uterus. The heart was markedly dilated, weak irregular sound with no definite murmur to be heard, but a definite thrill over the whole precordium. There were moist sounds over both lungs, and the base on either side was dull as far as the angle of the scapula. There was no sign of free fluid in the abdomen, but the back and the legs as far as the knees were edematous. As the patient was in a desperate state, had not responded to medical treatment, and was further handicapped by the continued vomiting, it was at once decided to empty the uterus, and as her general condition precluded any inhalation anesthesia it was thought that the spinal method should be adopted. Accordingly, using Barker's heavy solution of stovaine, Banister produced anesthesia in this way and emptied the uterus by vaginal hysterotomy. The operation was easy of accomplishment and was carried out fairly rapidly without the patient showing any sign of shock. The bleeding was trifling. Unfortunately, the edema of the lungs progressed and she died the next day.

Case 2.—The patient, a 5-gravida, had had attacks of failure of compensation with the last three pregnancies, and extremely trying confinements, and came up in the fifth month of the present pregnancy in a condition of marked severity. The face was cyanosed, breathing was only comfortable when she was sitting up, and she had a distressing cough. The pulse was 118, weak and irregular; temperature 97.6 F. The apex beat was in the seventh space 4½ inches from the mid-sternum, and the heart sounds were weak and flapping in character. There was no murmur. During the next three and a half months she was three times admitted in the same condition but improved under treatment. A week before term she was in a very distressed condition. The symptoms of cardiac failure were all very marked. Banister decided on cesarean section under spinal anesthesia for the following reasons: (1) cesarean section was the quickest method of delivery and the one which would throw least strain on her already enfeebled heart; (2) sterilization could be carried out and further risks of child-bearing avoided; and (3) as her cardiac condition seemed to be one of general myocardial degeneration, a general anesthetic was absolutely contra-indicated. She stood the operation extremely well. The patient got up on the fourteenth day, and left the hospital on the twentieth with her baby, both in good health.

Annales de Médecine, Paris

May, I, No. 5, pp. 469-592

16 *Familial Transient Paralysis of Legs Encountered in Northwestern France. E. Lenoble.
17 *Paroxysmal Form of Absolutely Irregular Heart Action. (La forme paroxystique de l'arythmie complète.) J. Heitz.
18 *Case of Mutilating Disease of the Legs. G. Guillain and J. Dubois.
19 The Thresholds of Renal Secretion. (Signification du terme de seuil de sécretion.) L. Ambard.

16. Transient Recurring Paralysis of the Legs.—Lenoble has encountered six cases in two families and in these alone in ten years of practice in Bretagne. There is evidently some organic lesion of the anterior horns of a certain segment of the lumbar spinal cord and nerve roots. He knows of nothing on record that compares with it, except what is called familial spasmodic dorsal tabes. The segment involved seems to undergo a senile degeneration, presumably from overuse. The paralysis of the extensor muscles comes on suddenly, in one leg at a time, with formication and sense of coldness. First one and then the other leg may be attacked, and the paralysis or impotence of the leg may be more or less pronounced but it passes off in a few weeks or months. The mildness of the phenomena and the pains in the legs suggesting sciatica are special features of the syndrome. The first attack came on at 25, 28 and 32 in one family and at 18, 20 and 24 in the other; all the patients were otherwise robust.

17. Paroxysmal Absolutely Irregular Heart Action.—Heitz gives a detailed history of ten cases of complete arhythmia occurring in paroxysms with or without valvular lesions and with or without high blood-pressure. The paroxysms may develop in connection with some overwork or intoxication or some infection that has touched the myocardium, or even without apparent cause. Such patients are generally neuropathic, subject to gastro-intestinal derangements, and sometimes presenting the stigmata of hysteria. Excessive thyroid functioning seemed to be an additional factor in some cases. The heart is generally enlarged and there are signs of arteriosclerosis and of habitual overexcitability of the auricular myocardium entailing fibrillation. The paroxysms may come on with intense palpitations, dyspnea, distress, vasomotor disturbances, swallowing of air and more or less pronounced reduction of the capacity of the heart to do its

work. Attacks of this kind generally last from six hours to five days, and recur at intervals of one to three months. In other cases the paroxysms are much briefer and milder but the intervals are shorter. As a rule the attacks lengthen and the intervals grow shorter in time until finally the absolute irregularity becomes continuous. One patient has had attacks of these paroxysms every two months for nine years. They last six to twenty-four hours but the ordinary rhythm outside of the paroxysms is still normal at the age of 65. Digitalis prolongs and may even bring on the attacks; it is contra-indicated therefore unless there is asystole. Drugs and other measures to soothe the nervous system and tranquillize the patient are the main reliance, supplemented possibly by local applications over the heart region, ice-bags, cloths wrung out of hot water or bags of hot sand. In the intervals the heart should be supervised, with special care for hygiene and diet. When the arhythmia has become permanent, digitalis may be systematically given to advantage. Morphin should be avoided and the patient reassured that the trouble is purely nervous and functional and will pass off without leaving any traces.

18. **Mutilating Affection of the Feet and Legs.**—The patient was a gardener of 54, apparently free from inherited or acquired taint. In 1905 he cut his heel on a piece of glass and ulceration and trophic disturbances followed, finally compelling amputation of the foot. Seventeen months later intense pains developed in the limb and further trophic ulceration. The other leg soon shared also in the mutilating affection. The differential diagnosis by exclusion was an ascending neuritis entailing secondary reactions in the meninges and spinal cord, possibly drifting into syringomyelia. The Argyll Robertson sign is positive but there are no other indications of syphilis.

Archives Générales de Chirurgie, Paris

July, VIII, No. 7, pp. 769-896

20 *Malignant Transformation of Dermoid Cysts in the Ovary. C. V. de Lapouge.
21 *Tuberculosis of the Clavicle. A. Martin.
22 Fascia Patch to Cure Hernia of Muscle. (Traitement des hernies musculaires par la greffe aponévrotique.) P. Mauclaire.

20. **Malignant Transformation of Dermoid Cysts in the Ovary.**—De Lapouge reports three cases of cancer in a dermoid cyst of the ovary and summarizes from the literature forty others, adding that several were of dermoid origin in Stroganova's twenty-two cases of cancerous degeneration of ovarian cysts (*Russky Vrach*, 1913). The presence of the cyst was known for many years in a number of cases before the malignant transformation took place, twenty-six years in one case. But when cancer is once installed it seems to run a rapid course, death following in six months at longest. The malignant transformation had progressed so far in the cases on record before operative treatment was applied that no instance of complete recovery is known. Intervention merely prolonged life a few weeks or months except in one of Tédenat's three cases in which the patient survived for seven years. Dermoid cysts, as a rule, do not manifest their presence until between 20 and 35, and then they are generally removed before there is a chance for malignant transformation. Even allowing for this there are over sixty cases on record of cancer in a dermoid cyst of the ovary. Pommier has reported a case with 4 dermoid cysts, one in the right and three in the left ovary, and two in this group developed cancer. When it has once spread beyond the walls of the cyst, irreparable damage is soon done.

21. **Tuberculosis of the Clavicle.**—Martin states that he knows of no instance of a tuberculous process in the clavicle of a child. The majority of those affected are comparatively young and have a history of tuberculous glandular processes or otorrhea. In one case the process occurred in the clavicle in a young man with inherited syphilis. None of the patients had certain pulmonary tuberculosis but some were regarded as "suspects." Four cases are illustrated, showing that either end of the shaft may be involved. If the latter, the findings are similar to those of spina ventosa in other bones.

Archives Générales de Médecine, Paris

July, XCIII, No. 7, pp. 581-672

23 Dilating and Speaking Cannula for Subglottic Laryngo-Tracheal Stenosis. L. Dufourmentel.
24 *Results of Sanatorium Treatment of Pulmonary Tuberculosis in Various Countries. (Tuberculose et sanatoriums populaires.) G. Artaud.

24. **Pulmonary Tuberculosis and Sanatorium Treatment.**—Artaud compares the statistics from nine countries of Europe during the years 1906 and 1910, comparing the figures for the death-rate and the results of sanatorium treatment, especially in Germany, Switzerland and France. His conclusions are that at least 50 and probably 75 per cent. of all in the early stages of tuberculosis can be permanently cured by the system of public sanatoriums and dispensaries. The main point is to discover the tuberculosis in its incipient stages, when it is always curable. The average stay in the sanatorium should not be less than six months; it is from the sanatorium alone that we can expect actual and durable cures. The tuberculous taking fresh-air treatment at home generally get too much medicine; the family think that drugging is the chief factor in all treatment of the sick. The result in this case is that the digestion gets upset, and when the tuberculous lose appetite and cease to be properly nourished, the downward course is rapid. The family, besides, is seldom skilled enough to ward off further contagion.

Archives Mens. d'Obstét. et de Gynéc., Paris

July, III, No. 7, pp. 1-48

25 *Congenital Tuberculosis. W. Möller.
26 *Total or Subtotal Hysterectomy? (Evidement systématique du moignon cervical dans l'hystérectomie subtotale.) De Rouville.
27 Dermographism of Pregnancy. H. Treub.

25. **Congenital Tuberculosis.**—Möller declares that we have no right to assume congenital tuberculosis in any case unless the child dies from it in the first or second week after birth and characteristic lesions are found in it, with tubercle bacilli. Analysis of the cases published as congenital tuberculosis shows that only about a half dozen conform to those conditions. He adds another to this group, the child dying two days after birth and showing lesions of pronounced and typical tuberculosis, with numerous tubercle bacilli. The location of the lesions corresponded to a primary infection of the intestinal tract, spreading by the lymphatics to the regional lymph-glands and from here penetrating at some point into the blood. Recent tuberculous lesions were found in the decidual membrane and panhysterectomy was done. Old tuberculous processes were evident in both tubes, and to these Möller traces the infection of the uterus and of the fetus. When the woman was delivered there was no suspicion of tuberculosis and the placenta was not examined.

26. **Technic for Hysterectomy.**—De Rouville declares that he is a "subtotalist," that is, in removing the uterus he amputates it above the cervix, and he here expatiates on the various advantages of this technic. After the amputation he cuts out with the bistoury the inside of the cervix stump, leaving only a shell a few millimeters thick. The stump is then sutured and peritoneum drawn down to cover it. This leaving merely the shell of the cervix thus links the total and subtotal technics, he declares, with the advantages of each and none of the disadvantages. The vagina is not opened, and thus danger of infection is avoided and there is no tendency to hemorrhage from the vaginal culdesacs, while the weight-bearing apparatus is left intact. Removing the inside of the cervix does away with the possibility of new growths in the cervical mucosa, and if such should develop in the shell left, they can be easily inspected and removed.

Revue de Gynécologie, Paris

May, XXII, No. 5, pp. 369-464

28 *Mobilization of Rectum in Repair of Complete Rupture of the Perineum. (Périnéorrhaphie pour rupture complète du perinée avec ou sans déchirure de la cloison.) S. Pozzi.
29 *Repair of Severed Ureter. (Ureterorraphie dans les sections totales de l'uretère.) P. Sejournet.
30 Spa Treatment and Gynecology. (Traitement hydro-minéral des maladies des femmes.) S. Pozzi.
31 Fibroma in Broad Ligament Accompanying Fibroma in Uterus. X. Bender.

28. **Repair of Perineum Torn Completely Across.**—Pozzi here describes with twelve illustrations the various steps of perineorrhaphy for complete laceration, according to the technic which he has been using for over twenty-five years and with constant satisfaction even in extremely serious cases. He loosens up the anterior wall of the rectum until it is free so that he can draw it down far enough to bring outside the part corresponding to the damaged perineum. By this means there is no suture in the rectal wall except where it joins the anus. This avoids the danger of infection from an intrarectal suture with eventual fistula. The transverse incision in the rectovaginal wall is made in such a way that a small edge of vaginal mucosa is left below the incision; this is a great help in restoring the anus. The incision is carried deep enough to expose the anterior aspect of the rectum. He never found it necessary to open the pouch of Douglas; it can easily be pushed aside by keeping close to the wall of the rectum. He has never had a failure with this technic, and has found it of great service also in rectovaginal fistulas of all heights, first cutting the perineum entirely across to produce conditions similar to those of complete rupture. If there is cicatricial shriveling later, rendering the anus too small, a posterior rectotomy answers every purpose. It is by no means a difficult matter to slit the rectovaginal wall in this way, separating the fibers by working in between them until the orifice of the rectum and of the vagina no longer stand parallel to each other, and can be slipped past each other like bureau drawers. Pozzi illustrates casts made from four quite complicated cases treated in this way thirteen or fourteen years ago, the outcome in all confirming the ease and simplicity and importance of this technic and the fine results and continence attained, and claims priority for the principles involved. He unites the muscles directly by a deep isolated suture, using catgut, and utilizing even mere scraps of the muscles, especially those connected with the sphincter. After this is done he passes two or three double silver wires through all the soft parts just above and crossing the suture of the muscles. The traction on the primary incision has transformed it from a transverse to a vertical incision; this is sutured and the anus restored by suturing the skin to the lower margin of the drawn down rectum, edging the anus, if possible, with a narrow border formed of vaginal mucosa. When all this is done the wires are tightened and tied over rolls of gauze outside. As long ago as February, 1894, Pozzi declared that the lacerated wall should never be sutured directly but be restored by loosening and drawing down the rectum.

29. **Suture of Severed Ureter.**—Sejournet summarizes from the literature seventy-four cases of ureterorrhaphy after complete section of the ureter, classifying them according to the technic applied. The results were better the more perfect the coaptation of the stumps. End-to-end suture is less liable to be followed by stenosis than suture by invagination. The suture should be protected with a small flap, possibly of omentum. The experiences related warn that a large flap of tissue usually shrivels so much that the fibrous retraction may lead to stenosis. It is prudent but not indispensable to leave a small drain or wick. Oozing of urine is generally transient and stops spontaneously but seems to leave a tendency to stenosis later.

Semaine Médicale, Paris

July 29, XXXIV, No. 30, pp. 349-360

32 *Drainage in Empyema. (Le soin ultérieur des pleurotomisés.) R. de Bovis.
33 "Undescended Cecum." (L'ectopie haute du cæcum et de l'appendice et son importance clinique et opératoire.) F. Lejars.

32. **After Evacuation of Empyema.**—De Bovis compares the different methods in vogue for draining after evacuation of empyema, his conclusion being that there is no need to dread the entrance of air as such a serious matter as some claim. Drains and siphons and rubber bulbs and all air-tight procedures can be dispensed with as a rule in treating simple benign empyema. By leaving the low wound open, without tubes or tampons, pus and false membranes escape and the absence of any foreign body leaves a free field to Nature to heal unmolested. This in itself is the best of all protections against ascending infection. The indispensable condition for this, however, is that the opening for evacuation of the empyema has been made ample enough, and that it was made at the exact point where gravity will prove most effectual to drain the pleura. To ensure these conditions it is necessary to resect a rib and to make the opening for the spontaneous draining at the lowest point of the slope, bearing in mind the patient's position in bed after the operation and during convalescence and whether the empyema is partial or total. He does not hesitate to close the incision and make a new one lower down if the first does not answer the purpose perfectly. He emphasizes further that the mobilization of the chest wall by the resection of a rib permits it to fall in under the pressure of the air so that, outside of the periods of inspiration, it shuts down air-tight over the convexity of the diaphragm and restricts if it does not prevent altogether the inflow of air. Air and microbes are also filtered and kept out more or less effectually by the dressings. As an operation for empyema is generally an emergency operation, the simplification of the procedure and of the after-care is a great gain. De Bovis does not believe that such large openings are necessary as Brinkmann advocates, and his experience with aspiration drainage has shown numerous disadvantages from it. He has applied the technic mentioned above in three cases and has been impressed with the prompt and complete recovery in from three to five weeks (except in the one case of tuberculous origin).

Beiträge zur klinischen Chirurgie, Tübingen

May, XCI, No. 3, pp. 403-718

34 *Epinephrin Content of Adrenals Is Markedly Reduced during Peritonitis. (Adrenalingehalt der Nebennieren bei akuten Infektionen.) Reich and Beresnegowski.
35 Treatment of Phlegmons on the Hand. M. Tiegel.
36 *Extensive Retrorenal Hemorrhage. (Zur Kenntnis der Massenblutungen ins Nierenlager.) Baggerd.
37 Curving Osteotomy for Crippled Knee. (Bogenförmige Osteotomie bei Winkelankylosen und arthrogenen Kontrakturen des Knies.) W. Schmidt.
38 Technic for Extensive Resection of the Thorax for Old Chronic Empyema. Peuckert.
39 Combination of Local Anesthetics with Potassium Sulphate Enhances Action of Some, Reduces It with Others. A. Hoffmann and M. Kochmann.
40 *Sunlight Plus Mountain Climate in Treatment of Tuberculosis of the Hand. (Erfolge der Heliotherapie im Hochgebirge.) A. Hüssy.
41 Temporary Resection of Roof of Mouth. (Temporäre Gaumenresektion.) Partsch.
42 Prothesis for Treatment of Cleft Palate. (Prothesenbehandlung der Gaumenspalten.) Riegner.
43 *Diagnosis of Nature and Location of Ileus. A. Tietze.
44 Pneumatosis of the Intestines. F. Neugebauer.
45 Villous Tumors of the Rectum; Two Cases. C. Goebel.
46 Technic for Closing the Pylorus Permanently with Duodenal Ulcer. A. Peiser.
47 Injections of Menthol-Eucalyptol in Prophylaxis and Treatment of Postoperative Bronchitis. Technau.
48 Serodiagnosis of Cancer. (Die Carcinomreaktion nach Abderhalden.) Fritsch.
49 Surgery of Peripheral Nerves. Borchard.
50 *Juvenile Deforming Osteoarthritis. G. Drehmann.
51 Gonorrheal Arthritis. C. Goebel.
52 Spontaneous Fracture after Periostitis from Overuse. Kolepke.
53 Negative Experimental Experiences in Regard to Regeneration of Periosteum. S. Weil.
54 Plugging Cavities in Bones with Pedunculated Muscle Flaps. (Plombierung von Knochenhöhlen durch gestielte Muskellappen.) R. Levy.
55 Electric Conductibility of the Urine in Diagnosis of Kidney Disease. (Verwertbarkeit der Leitfähigkeitsbestimmung des Urins in der Diagnostik der Nierenkrankheiten.) Renner.
56 Disadvantages of the Phenolsulphonephthalein Test; Not a Reliable Aid in Surgical Kidney Disease. K. Wrobel.
57 Tendency to Suffocation from the Thymus. (Thymusdrüse als Atemhindernis.) C. Ritter.
58 Technic for Avoiding Complications after Extensive Operations on the Chest. E. Jeger and J. Leland.
59 Technic for Suturing the Arch of the Aorta. E. Jeger and J. Leland.

34. **Epinephrin Content of Adrenals in Acute Infections.**—Reich and Beresnegowski report extensive experimental work and clinical investigation the results of which seem to indicate that the epinephrin content of the adrenals is very much below the normal proportion in more than half the cases of acute peritonitis. This lack of normal epinephrin content

readily explains the central vasomotor paralysis and weakness of the circulation which accompany acute peritonitis in man. Their research does not indicate that all acute infections affect the adrenal cortex so rapidly and injure it so severely as was evident in over 50 per cent. of the fatal peritonitis cases examined. This disease takes the lead in this respect. The findings in regard to the staining properties of the adrenal cortex are tabulated from 27 cases of acute peritonitis, 11 cases of chronic infections and 12 cases of acute infections not involving the peritoneum.

36. **Perirenal Hemorrhage.**—Baggerd reports a case of fatal spontaneous hemorrhage into the bed of the kidney. It proceeded from the kidney itself; in a previous case of extensive retrorenal hematoma the blood came from an adrenal. The typical symptoms of sudden intense pain in the kidney region, signs of severe internal hemorrhage and development of a tumor back of the kidney were pronounced in both cases. In these as also in a number of others on record there had been preceding milder attacks; Lenk's patient had nine in the course of three years. In Baggerd's case there had been attacks every six or eight weeks at first, each lasting two or three days; the intervals were free from pain. These attacks may have been due to preceding small hemorrhages in some cases, but in his case they were explained otherwise by a tendency to hydronephrosis kinking the ureter, and each time the attack had been preceded by a drinking bout, as also the last and most severe attack. The kidney was found floating in a pool of blood and the patient, a man of 44, never rallied after the nephrectomy. The mortality of perirenal hemorrhage is still high, 40 per cent., as the operation generally comes so late. The mortality was 100 per cent. in all the cases under conservative treatment alone. Various operative measures have been applied; the special procedure is not so important as prompt intervention to arrest the hemorrhage.

40. **Tuberculosis of the Hand and Heliotherapy.**—Hüssy tells remarkably favorable experiences with direct sunlight treatment of tuberculous processes in the hand and wrist, beseeching surgeons in particular to heed his words and refrain from operating in this class of cases and apply heliotherapy. He was assistant to Rollier, and gives the details of 32 cases. In 21 fistulas had already developed in the process in hand or wrist; in 29, lymph-glands were involved, and in 12 the lungs, while other local surgical tuberculous processes were evident in 25. The hand process healed completely under the systematic exposure to the mountain sunlight in 23 cases, and another patient was much improved. These patients have completed their course and left, the functional use of the hand is fully restored in nearly all. Eight others are still under treatment although the hand is entirely healed. In 17 of the 24 cured patients who have left Leysin all other tuberculous manifestations have been cured likewise, and in 5 they have materially improved. Three others have succumbed since to the progressive course of their multiple lesions but without return of the hand process. Heliotherapy, he emphasizes, must be applied only by physicians trained in orthopedic and surgical measures, applying the technic of each as needed, not leaving the entire task to the sunlight. Physicians at the head of tuberculosis institutions must in some way acquire the necessary surgical and orthopedic technic if they accept patients with surgical tuberculosis. The orthopedic side of treatment, punctures, proper position of the part affected, etc., are liable to be neglected when the institution is run by an internist. More use should be made in private practice of the curative action of direct sunlight. Surgical tuberculosis should be brought out of the sick-room into the light and air.

43. **Ileus.**—Tietze says that in 133 cases of ileus in which he has operated exaggerated peristalsis was pronounced in all cases except those in which peritonitis had already developed or the obstruction was not organic. Wahl declares that strangulation ileus and dynamic occlusion of the bowel both act alike on the peristalsis, paralyzing it. Tietze's experience thus confirms Wahl's theory and shows further that feculent vomit sometimes accompanies septic paralysis of the bowel from peritonitis and must not be regarded as a sign only of mechanical ileus. The importance of distinguishing between paralysis of the bowel and mechanical obstruction he regards as so vital that he does not hesitate to say that in the former case an operation is a blunder—except when a fistula into the bowel is directly planned—while with mechanical obstruction an operation can be at worst merely hastening the almost inevitably required intervention. He classifies his material under various headings; 41 died of the 81 patients with mechanical ileus; 9 of the 35 with ileus from internal incarceration, volvulus or adhesions; none died of the 4 with torsion of the omentum, but 5 died of the 9 with ileus from necrosis of the pancreas—a total mortality of 42.1 per cent.

50. **Juvenile Deforming Arthritis.**—Drehmann has encountered nine cases of an affection of the head of the femur in children analogous to coxa vara in adolescents, only it is the reverse condition. Perthes found in similar cases that the surface of the head was flat instead of round and almost a groove had been hollowed out across the top. The cartilage is of normal structure and color and the bone itself seems of normal structure. Whether slight trauma or infection is involved is open to discussion, but there is no question that the deformity is the result of weight-bearing strain. The children affected are between 5 and 10; they begin to limp a little but do not complain of pain. The hip-joint can be used freely except that abduction, either passive or active, becomes impossible. There is no adduction as with coxa vara, but there may be a slight inward rotation. The limp suggests the gait with congenital dislocation. There is no trace of contracture as with an inflammatory process. The limping continues and there may be pain when fatigued, relieved by resting. There is no shortening of the limb as a rule, and after a few years the child ceases to limp and, except for more or less inability to abduct the limb, there is nothing left of the trouble.

Deutsches Archiv für klinische Medizin, Leipzig

CXVI, Nos. 1-2, pp. 1-200. Last indexed August 22, p. 713

60 Mixed Forms of Derangement of Kidney Functioning. (Zur Kenntnis der Nephropathien. III.) P. v. Monakow.
61 Effect of Small Doses of Toluylendiamin on the Blood; Experimental Polycythemia. (Enstehung experimenteller Hyperglobulie.) R. Hertz and M. Erlich.
62 Gasometric Determination of Urea, etc., in a Few Drops of Blood. (Zur Analyse sehr kleinen Stickstoffmengen in organischem Material.) R. Siebeck.
63 Murmurs in Arhythmia of the Auricle. (Präsystolische Gerausche bei Vorhofsflimmern.) E. Weiser.
64 The Heart a Pressure Pump but Not a Suction Pump. (Zur Frage der Saugwirkung des Herzens.) A. Lehndorff.
65 Variations in the Serum Concentration in Scarlet Fever. W. Kalser and J. Löwy.
66 Ammonia and Total Nitrogen Excretion in the Urine on Different Diets and Especially on a Rice Diet. Z. Tanji.
67 Proteus Meningitis and Proteus Sepsis in a New-Born Child; Bacillus Proteus as Cause of Disease in Man. F. Goebel.
68 The Function of the Kidney in Diabetes Insipidus. L. Lichtwitz and F. Stromeyer.
69 Total Metabolism and Albumin Metabolism in Patients with Carcinoma. E. Wallersteiner.

Deutsche medizinische Wochenschrift, Berlin

July 30, XL, No. 31, pp. 1553-1600

70 *Treatment of Acute Weak Heart Action. (Behandlung bedrohlicher Erscheinungen bei der Herzschwäche.) J. Grober.
71 Vaccine Therapy of Typhoid. R. Kraus and S. Mazza.
72 *Improved Technic for Serodiagnosis. (Kritik des Dialysierverfahrens und der Abwehrfermentreaktion.) H. Oeller and R. Stephan. (Neue Methode zum Nachweis der Abwehrfermente.) P. Hirsch.
73 Normal Sugar Content of Blood in Case of Addison's Disease. (Blutzucker bei Morbus Addisonii.) J. Brockmeyer.
74 *Fatal Hematoporphyrinuria after Ten Grams of Sulphonal in Nine Days. (Letale Hämatoporphyrinurie nach Sulfonalgebrauch.) Pförtner.
75 *Periodical Arhythmia. (Zur Kasuistik der periodischen Unregelmässigkeit des Pulses.) K. Rinderspacher.
76 *Pancreatitis—Complication of Mumps? N. Dracinski and J. Mehlmann.
77 *Acute Retention of Urine under Morphin. (Die akute Harnverhaltung eine wenig beachtete Wirkung des Morphins.) A. Czapek and S. Wassermann.

78 Roentgenotherapy of Tuberculous Lymph Glands. Kühlmann.
79 Origin of Partial Antibodies. (Beziehungen der im Blut kreisenden Tuberkelbazillen zu der Entstehung von Partialantikörpern.) A. Mayer.
80 *Access to Knee-Joint by Sawing the Patella Lengthwise. (Eröffnung des Kniegelenkes bei Meniscusverletzungen durch Längsschnitt mitten über die Patella und deren Durchsägung.) P. Babitzki.
81 Preparation of Blood Platelets for Hemostasis in Operating on the Nose. (Das Coagulen Kocher-Fonio in der Rhinochirurgie.) E. Barth.
82 Refusal to Permit an Operation Considered from Standpoint of Workmen's Compensation Legislation. (Die Operationspflicht des Verletzten.) G. Puppe.

70. **Acute Weakness of the Heart.**—Grober comments on the diverse causes which may render the circulation inadequate. In nearly every instance death is the result of the heart's giving out. Acute overexertion is one of the most frequent causes of this and even a normal circulatory system may suffer severely from acute overexertion. The first thing in treatment is to relieve the heart of all the work possible; this is best accomplished by strict bed-rest. He thinks that the bed-rest is the most efficient factor in the "Karell cure." When the left ventricle is not working properly, the peripheral and pulmonary vessels become gorged with blood and great relief may be obtained from venesection. In one case he successfully repeated the venesection (500 c.c.) after an interval of three days. This is particularly useful with sudden and threatening cardiac asthma. Inhalation of oxygen may give great subjective relief, especially in chronic heart disease, but he does not ascribe any objective efficacy to it. The defective heart action may lead to transudation in the pleura, etc., and this hampers the heart action still further and immediate puncture may be indispensable. After tapping of ascites, a pleural effusion may be spontaneously absorbed. Or it may be advisable to drain away all the surplus fluid by several minute incisions 1 or 2 cm. deep in the dorsum of the foot. He has done this in several cases; the wound closed up spontaneously in a week or so.

Other means to influence transudation are to restrict intake of fluids and to stimulate diuresis. Calomel is very useful here but is contra-indicated on suspicion of nephritis. He gives 0.2 or 0.3 gm. calomel three times a day, continuing for three or four days, by which time the urine usually increases to 6 liters or more. The diarrheic stools under the calomel also aid in throwing off excess fluids, but they must not be allowed to weaken the patient. The patient with acute weakness of the heart is frightened and restless, and this emotional strain aggravates the heart disturbance and calls for a sedative drug, although heart disease reduces the tolerance for narcotics. Grober emphasizes that the physician should keep the giving of the narcotics in his own hand; he does not like to trust this to the patient or his family. When the chronic heart disease is beyond repair and there are periodically recurring attacks of asthma, he does not hesitate to give morphin to abort the attacks.

In acute heart weakness, however, the chief reliance is on camphor, and he urges not to wait until it is a last resort. A subcutaneous injection of camphor seems to ward off the dangerous consequences of morphin on the circulation while not interfering with its action on the nervous system. The camphor may induce nephritis if the kidneys are already below par or if the patient is a child, but the serious condition of menacing heart failure outweighs in importance a possible injury to the kidneys. In acute heart weakness he does not hesitate to make several injections of 1 c.c. camphorated oil (10 per cent.) at five minute or even shorter intervals. When the heart action shows signs of improvement he lengthens the intervals to half an hour or an hour or changes to intravenous injection of some preparation of digitalis. The pressing danger once past, digitalis can be continued by the usual technic by the mouth.

72. **Serodiagnosis of Pregnancy.**—Oeller and Stephan state that the conception of autosensitization under the influence of pregnancy is all that is new in Abderhalden's work, and that his dialysis and optic methods of serodiagnosis have so many sources of error that there can be no question but that they are based on mistaken premises. They obtained positive dialysis findings in a large number of men while the findings were occasionally negative in pregnant women. They report that by a preliminary dialysis for six hours with salt solution it seems to be possible to get rid of some antiferment bodies which otherwise inhibit or attenuate the digestion of the placenta tissue in the test.

Hirsch calls attention to the change in the concentration of the fluid after digestion of placenta tissue by the Abderhalden technic. If there is no change in the concentration of the fluid then it may be assumed that no digestion has taken place, and this is presumptive evidence of the absence of specific protective ferments. He uses an interferometer to test the fluid before and after for any change in concentration, and reports that tests with this technic have confirmed anew the strictly specific nature of the protective ferments.

74. **Sulphonal Poisoning.**—Pförtner's patient was a previously healthy woman of 30 with three healthy children. She developed manic-depressive insanity after an abortion without known cause. As she was growing rapidly weaker under her extreme restlessness day and night and irregular ingestion of food, she was given 10 gm. of sulphonal in the course of nine days. Obstinate constipation followed and the third day there was retention of urine for twenty-four hours and then the urine presented the typical port-wine tint of hematoporphyrinuria followed a day or so later by vomiting, colic and fatal collapse. Pförtner reviews other cases on record of hematoporphyrinuria after sulphonal, trional or veronal; Günther has compiled forty-seven sulphonal cases, with a mortality of 30 or over 53 per cent.; the outcome in 18 cases is not known but only 8 of the patients are known to have recovered. The disturbances ran an acute course in some and in others dragged over weeks and years. He advocates sodium bicarbonate in treatment. Necropsy has always revealed inflammation and atrophy of the kidneys, but nothing of the kind was found in Pförtner's fulminating case; probably there had not been time for them to develop.

75. **Periodical Arhythmia.**—Rinderspacher reports the case of a girl of 10, always healthy until diphtheria the year before. Since then she had complained of pains in the back and chest and palpitation of the heart on slight cause. The tracings indicate mitral insufficiency but this does not explain the occasionally recurring irregularity of the pulse. This is evidently due to some periodical tendency to heart-block brought on by functional disturbance of the conducting fibers between the sinus and the auricle, on which becomes superposed at times the influence of stagnation in the coronary veins. This assumption is sustained by the fact that by putting an end to the coronary congestion, the heart-beat becomes regular once more. This case teaches that digitalis may prove useful even for heart-block.

76. **Pancreatitis Following Mumps.**—Dracinski and Mehlmann report that during a recent epidemic of mumps embracing hundreds of cases (Bukowina), three cases developed symptoms suggesting acute pancreatitis, but the syndrome subsided harmlessly in each in less than a week. Recovery was complete in about ten days after the first symptoms of mumps had been noticed. Each patient developed at about the fourth day of the mumps, herpes, intense frontal headache, vomiting suggesting ileus, fever with delirium, collapse, pains and tenderness above the umbilicus, intense acetonuria and Cheyne-Stokes breathing, and in two the pulse grew very slow. In each of the three the knee-jerk was abolished, as was also the case in 10 per cent. of all the mumps patients examined, and in all the cases with this finding the course of the mumps was exceptionally severe.

77. **Retention of Urine under Morphin.**—Czapek and Wassermann report five typical cases in which complete retention of urine followed a therapeutic dose of morphin. Pal and Hirsch found that spasmodic contraction of the pylorus was frequently observed in dogs after a dose of morphin, and the same mechanism is probably involved in the occasional retention of urine after morphin has been given, the bladder sphincter closing up, and the auxiliary abdominal muscles

being too weak to force it. It has been observed only in men, and it is possible that the retention of urine from this cause may occur after operations on the skull and abdomen and be ascribed to operative shock and other causes.

80. **Sawing the Patella.**—Babitzki's patient has complete functional use of the injured leg and can climb stairs, etc.; a year has elapsed since the operation done to correct dislocation of the internal meniscus of eighteen years' standing. To obtain ample access to the meniscus without injuring the muscles and ligaments, he cut down lengthwise on the median line, sawing through the patella and turning back the halves. The technic has proved so satisfactory that he commends it to others and gives an illustration of the joint thus opened up.

Zeitschrift für Urologie, Berlin

July, VIII, No. 7, pp. 529-608

83 *Endoscopic Diagnosis and Treatment of Proliferating Urethritis. H. Lohnstein.
84 *Kidney Operations with Bilateral Kidney Disease. (Nierenoperation bei doppelseitigen Nierenkrankungen.) L. Casper.
85 Second Urethra without Connection with Bladder. (Blind endende 12 cm. lange zweite Urethra.) M. Porosz.
86 Simplification of Endovesical Operations. J. Vogel.

83. **Proliferating Urethritis.**—Lohnstein here confirms anew his statements of eight years ago in regard to the necessity for more vigorous measures than usual when urethritis assumes a proliferating type. Curetting may be necessary before the inflammation shows signs of yielding. He gives directions how to do the curetting without injury, saying that he has done it 600 times on 100 patients. In seventy-five of the cases the obstinate discharge became much reduced or disappeared entirely after the curetting done under endoscopic control. He gives an illustrated description of a little roller attachment for the urethroscope which he uses to squeeze out and massage foci of retention in the urethra when there is no actual proliferation of tissue. It may be usefully combined with the curet. The points in which the secretions are most liable to be retained are the prostatic fossula, the bulb and the middle of the pars cavernosa.

84. **Kidney Operations with Bilateral Kidney Disease.**—Casper relates that eight soon died in nine cases of bilateral kidney disease in which the results of functional tests misled him to assume that the second kidney would be equal to the task imposed on it by nephrectomy. He now refrains systematically from operating if—even once—no sugar is eliminated in the segregated urine after the phlorizin test, or if the test with a stain shows tardy change in the tint of the urine, and the tint is merely green, or if the kidney merely stiffens up from lack of the normal reaction to intake of fluids. These are his main criteria for judging the degree of insufficiency of the other kidney. He thinks that tests with alien substances give more reliable findings than those with substances found in the body.

When no sugar is eliminated after the phlorizin test in a case of contracted kidney, this shows that the individual is so impaired that he is scarcely able to stand the removal of the other kidney. If the test indigo-carmin is also eliminated unduly slowly, and there is not the normal polyuria after drinking a given amount of water, it is better to abandon a contemplated operation on the kidney primarily involved. He has made thousands of tests with phlorizin and found that healthy kidneys, without exception, eliminate sugar thereafter. Some mechanical obstruction or defective phlorizin must be incriminated when a negative response is obtained from a healthy kidney. The phlorizin settles to the bottom of the receptacle as the solution cools. Another possible source of error is extreme dilution of the urine from drinking much water. The test is less distinct when the patient is fasting; it is best to allow merely one to three hours after a meal. Considerable albuminuria is also liable to mask the findings of the test. In the few cases in which the negative findings failed to harmonize with the apparently normal condition of the kidneys, the further course of the cases gave the explanation as a hitherto latent contracted condition of the kidney became apparent. Atrophy from pressure can also run a latent course for a time. In a number of cases of enlarged prostate the kidney parenchyma had wasted away to merely a small strip of cortex, and this can occur without appreciable symptoms. Sometimes polyuria may be the only manifestation of this loss of kidney substance under the influence of pressure.

Zentralblatt für Chirurgie, Leipsic

August 1, XLI, No. 31, pp. 1281-1312

87 Extension Dressings of Tubular Tricot and Varnish. (Trikotschlauch-Mastisol-Extensionsverbände.) E. A. Lüken.
88 Mobilization of Abdominal Wall to Draw It over to Close Large Defect. (Mobilisation der Bauchwand bei grossen Ventralhernien.) S. Wideröe.

Zentralblatt für Gynäkologie, Leipsic

August 1, XXXVIII, No. 31, pp. 1089-1120

89 *Mesothorium in Treatment of Cancer. P. Zweifel.
90 *Intra-Uterine Application of Radium for Cancer. (Zur Wertung der intrauterinen Radiumapplikation bei Carcinoma uteri.) E. Meyer.

89. **Mesothorium in Treatment of Cancer.**—Zweifel's microscopic findings in cancers after mesothorium treatment confirm the destructive action on cancer cells; the normal cells showed comparatively little change under the exposures. His experience warns of the necessity for extreme care in protecting the abdomen outside of the focus; some stray rays in a few cases evidently did some injury as the patients complained of severe pains and tenesmus and one passed some scraps of bowel tissue in the stools. He recalls two of his older cases of uterine cancer in which the cancer was apparently cured by an extensive local streptococcus process but returned three or four years later. He thinks that the action of mesothorium must be explained in much the same way; the reaction to the mesothorium rays is like a burn, and in the course of this physical process the cancer cells become destroyed and are reabsorbed. It is possible, further, that the reabsorbed cells have a therapeutic action like the autolysates. He urges all who apply radiotherapy to publish an additional report on their cases after a year has elapsed.

90. **Intra-Uterine Application of Radium for Cancer.**—In the first of the two cases under the influence of the endocervical radium treatment a cancer of the cervix subsided completely, leaving merely a considerable defect. In the second case the same technic led to fulminating sepsis, speedily fatal. Necropsy failed to reveal any cause for the difference in the results observed.

Zentralblatt für innere Medizin, Leipsic

August 1, XXXV, No. 31, pp. 745-768

91 *Clinical Importance of the Systolic and Diastolic Blood-Pressure in Infectious Diseases. (Blutdruck bei Infektionskrankheiten.) J. S. Schwarzmann.

91. **The Blood-Pressure in Infectious Diseases.**—Schwarzmann here summarizes his conclusions from study of the systolic and diastolic blood-pressure in eighty cases of various acute infectious diseases. A high diastolic blood-pressure indicates a tendency to paralysis of the larger abdominal vessels with accumulation of the blood in them, and hence this must be accepted as a sign of the severity of the infection. A lower systolic pressure with a lower diastolic pressure is not a sign that the heart is weakening but only that the vascular tonus is growing less. On the other hand, when the diastolic pressure rises while the systolic falls, this is a sign that the heart is weakening. The importance of these findings for the prognosis and for prompt therapeutic measures is obvious.

Policlinico, Rome

July, XXI, Surgical Section No. 7, pp. 309-360

92 *Tuberculosis of the Breast. (Tubercolosi della mammella multiebre.) L. Durante.
93 Subphrenic Abscess Following Measles in a Child under Five. P. Ligabue.
94 *Paraffin and Wax Shield in Treatment of Inguinal Hernia in Children. (Nuovo procedimento nella cura radicale dell'ernia inguinale nei bambini.) A. Nota.
95 Subglenoid Dislocation of the Humerus. A. Sebastiani.
96 *Degrees of Detachment of the Mesentery Compatible with Retention of the Vitality of the Intestine. (I varii gradi del distacco del mesentere in rapporto alla vitalita e funzionalita dell'intestino.) P. Azara. Commenced in No. 6.

92. **Tuberculous Process in the Breast.**—Durante adds two new cases to the 150 he has found on record. The tuberculosis seemed to be primary in the breast in one of his cases. Six of the patients were males. The ages ranged from 20 to 40 in the majority and an inherited taint was generally evident. Trauma was incriminated in three cases. When there are other tuberculous lesions the diagnosis is easy when the isolated hard nodules are discovered in the breast, especially when the nodules are adherent to the skin and the lymph-nodes in the axilla display a tendency to enlargement. He insists that amputation of the breast or excision of the focus should be done at once with an incipient or primary tuberculous process but when there are already multiple fistulas, or the mammary process is secondary to tuberculous lesions elsewere, iodin, locally and internally, with general measures, is the main reliance.

In one of his own cases the microscope showed simple adenofibroma of the breast with typical tuberculous lesions in the lymph-glands surrounding the mamma and in the axilla. The patient was a frail woman of 33 who had never menstruated. The glands around the mamma and in the neck had commenced to enlarge seven years before and there was dulness over both apices. The mammary affection was evidently a retrograde process from the axillary glands, but instead of setting up a typical tuberculous lesion, merely an ordinary fibrous growth was produced. The second patient was a healthy girl of 19 who suddenly developed pruritus in the lower part of the mamma and in a few days a lump appeared, tender on pressure; in five days it developed a fistula. The Wassermann was negative, the skin tuberculin reaction slightly positive. Excision of a scrap the thirtieth day after the first symptoms revealed giant cells but no acid-fast bacilli. The lesion was excised into sound tissue. It was evidently a primary process. The girl had never been pregnant.

94. **Inguinal Hernia in Children.**—Nota gives an illustration showing his method of blocking the inguinal canal with a sheet of paraffin cut to form a deep crescent which is introduced under the cord, the horns extending upward under the pillars on each side. The canal is then sutured together over the paraffin plate in three tiers. Experiments on animals had demonstrated the smooth healing and permanent integrity of plates made of equal parts of wax and of paraffin with a melting point at 50 C. They are boiled together for twenty minutes and then poured on a sheet of glass to form a plate 3 mm. thick. The wax is absorbed in time, its place being taken by connective tissue which thus forms a solid shield with the paraffin. He has found this method extremely simple and reliable as he has applied it in 150 cases, and it proved equally effectual for two youths of 14 and 18. Some of the children were under 2.

96. **Separation of the Omentum Compatible with Retention of Vitality of Intestine.**—Azara concludes from his experiments on fourteen dogs that separation over a stretch of 5 cm. along the margin of the bowel does not compromise it beyond repair, and hence that up to this distance treatment can be conservative. With separation over a stretch of 6 cm., the functioning of the intestine is so seriously compromised that resection is required unless there is a strip at least 1 cm. wide left still attached to the intestine. This is sufficient to maintain its vitality as a rule. But a stretch 18 to 25 cm. long, even at a distance of 3 cm. from the edge of the intestine, entails inevitable gangrene of the bowel. A stretch up to 15 cm. long, with a strip left on the bowel 3 cm. wide, never was followed by gangrene but cicatricial shriveling sometimes interfered with bowel functioning. Conservative treatment is indicated in this case but the patient should be supervised, ready to operate on suspicion of trouble.

Tumori, Rome

May-June, III, No. 6, pp. 697-827

97 *Comparative Study of Different Biologic Technics for Diagnosis of Cancer. (Nuove ricerche comparative sui metodi d'indagine biologica per la diagnosi dei tumori maligni.) G. Mioni.

98 Autolysates of Embryonal or Cancer Tissues in Treatment of Cancer. (Immunizzazione attiva o chemoterapia istogena.) G. Fichera.

99 Chronic Inflammation and Benign Tumors of the Breast. (Flogosi croniche e tumori benigni della mammella.) A. Cimoroni. To be continued.

97. **Biologic Tests for Cancer.**—Mioni has been making a comparative study of various biologic tests and states that the meiostagmin reaction proved positive in 57.1 per cent. of the thirty-five cases; Crile's hemolytic test was positive in 62 per cent. and in the negative cases the cancer was in an advanced stage or a superficial growth so that the diagnosis was clinically beyond question. On the other hand, in most of the cases giving a positive response the cancers were in the viscera and many of them in the earliest stages of development. The fact that hemolysis occurs also in tuberculosis, etc., scarcely invalidates this test as the clinical manifestations otherwise exclude mistakes as a rule. Elsberg's reaction was obtained only in 11.2 per cent. The antitryptic index was characteristically high in 91.4 per cent. and thus proved its value as an aid in the diagnosis of cancer in dubious cases. The deviation of complement tests did not give reliable results in his hands, and passive anaphylaxis tests also proved uncertain. He remarks in conclusion that after excision of the cancer the various biologic tests all veered more or less promptly to a negative reaction. The details of the various groups tested with the different technics are tabulated for comparison—a total of thirty-five cancer cases and thirty-five controls, all put through the various tests.

Nederlandsch Tijdschrift voor Geneeskunde, Amsterdam

April 11, LVIII, No. 15 and Supplement, pp. 1117-1278

100 *Hemiopic Reaction of the Pupil as Aid in Diagnosis of Brain Tumor. F. S. van B. Bastiaanse.

101 Unfavorable Workings of Workmen's Compensation Laws. J. A. Korteweg and B. H. Sajet.

102 Plague in Java and Measures to Combat It. G. Brouwer and J. I. van Loghem.

April 18, No. 16, pp. 1279-1346

103 Classification of Club-Foot on Anatomic Basis and Treatment Adapted to Each Form. F. Schultze.

104 The Movements of the Stomach as Studied under Roentgenoscopy. P. C. Romkes.

105 *Fatal Action of Hypnotic in Case of Jaundice. A. Hendriks.

100. **Hemiopic Reaction of Pupil as Aid in Diagnosis.**—Bastiaanse expatiates on the importance of determining a hemiopic reaction of the pupil. With the extremely simple procedure he describes it is possible to distinguish between central hemiopia and hemiopia resulting from an interruption in the optic tract. The test can be applied even to a sleeping child, and the findings are more objective than determination of changes in the visual field. An illustrated description is given of a typical case. The patient was a stout woman of 47, who complained seven years ago that her eyesight was growing poor. The hemiopic reaction indicated interruption of the optic tract and the further course of the case confirmed the assumption of a tumor pressing on the sella turcica, etc.

105. **Death after Ordinary Dose of Medinal in a Case of Jaundice.**—Hendriks' patient was a well built man of 41 with cirrhosis of the liver, ascites and jaundice. Although confined to bed he was in such good condition that omentopexy was being considered. As he worried over the prospect of the operation and had not slept well for a few nights, Hendriks prescribed a sedative, a mixture of 200 mg. antipyrin; 700 mg. medinal; 2 gm. potassium bromid, and distilled water to 30 gm. The patient took, as ordered, one tablespoonful in the evening and slept but did not wake. He was found in coma in the morning, and died the following night with symptoms of pulmonary edema. Hendriks says that no other cause for the fatality could be discovered except the action of the hypnotic in a patient with intense jaundice.

Hospitalstidende, Copenhagen

August 5, LVII, No. 31, pp. 953-984

106 Experiences with Serodiagnosis. (Kritik over Abderhaldens Dialysemetode.) A. Bisgaard and A. Korsbierg.

107 Chondroma in the Larynx. (Klinisk Bidrag til Strubens Brusksvulster.) K. Salomonsen.